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CONTENTS

THE EDITORS SAY:

CERA Conference

". . . To discern events in their beginnings, to foresee what is coming, and to forewarn others."

The above quotation from Demosthenes was the cover theme of the California Educational Research Association's 37th Annual Spring Conference held in Sacramento on March 13 and 14, and its application to educational research was ably demonstrated by a stimulating and challenging program. The exchange of ideas and the dissemination of information which took place during the two-day conference will be of great benefit to all education and to all educators.

The program was highlighted with addresses by Roy Hall, Howard Bowman, Harold Seashore, Dolores Durkin, and David Krech, and the presentation of 60 research papers during the course of 17 section meetings devoted to a variety of topics. The general sessions were presided over by Hazel Lewis, CERA president; Glenn Durflinger, first vice-president; and Floyd Marchus, second vice-president, at which time greetings were extended by T. R. Smedberg, Sacramento County Superintendent of Schools, and William Burkhard, Superintendent of the Sacramento Unified School District.

The California Teachers Association and the California Advisory Council on Educational Research are proud to cooperate with the CERA by publishing a major part of the proceedings. In this issue will be found summaries of the five major addresses, as well as abstracts of the papers which were presented. The editors found this to be a difficult task. Many vital things were said and many important projects reported, but because of the limitations of space each address had to be condensed and each paper allotted only a few lines. However, we think that our readers will enjoy the reviews and will perhaps catch the flavor of the meeting.

We congratulate the CERA for its splendid work and extend to its officers our special commendations for the fine planning which contributed so much to the success of the conference. We offer our continuing services to aid this worthwhile organization.—JHB

The Cooperative Research Program

Digest of Speech by

Roy M. Hall

Assistant Commissioner for Research
Office of Education
U. S. Department of Health, Education, and Welfare

A growing recognition of a need for more basic research in education, as well as in related disciplines, led to the passage of Public Law 531 by the 83rd Congress. This law was signed by the President on July 26, 1954. It authorizes the Commissioner of Education to "enter into contracts and jointly financed cooperative arrangements with universities and colleges and State educational agencies for the conduct of research, surveys, and demonstrations in the field of education."

No funds were appropriated to support research under this law until July 1956. During the preceding months the Office had identified ten areas in which it felt research was especially needed and had set up a permanent Office of Education Research Advisory Committee of nine members. When approximately $1 million was appropriated for the fiscal year 1957, the Cooperative Research Program was ready to go into operation. The appropriation for the second year was $2.3 million, and for the current fiscal year $2.7 million. Thus, a total of $6 million has already been appropriated by the Congress in education under the terms of Public Law 531. This substantial amount is concrete evidence of a strong belief in the importance of research in every field and of the special need for it in education.

Additional evidence of the strength of the Cooperative Research Program is given by the steady flow of applications for the support of research which have been received from colleges and universities and State departments of education. There were already 70 applications on hand at the beginning of Fiscal 1957. By the end of that first year a total of 324 applications had been received; by the end of the second year this number had risen to 490; and as of December 31, 1958, we had received a total of 641 applications.

Equally important is the number of research projects which have actually received support under the Cooperative Research Program. During the first year 72 projects were begun. At the end of the second year this number had risen to 133, and as of last December 31 a total of 159 projects had been initiated. This had risen to 166 by the end of February, and the number is steadily increasing as we go about negotiating contracts for the support of the 26 projects recommended by our Advisory Committee at its February meeting. There are approximately 75 different colleges and

universities and 13 different State departments participating. These are located in 36 different States (including Alaska), the District of Columbia, the Territory of Guam, and Puerto Rico.

Since the beginning of the program we have received a total of 39 applications for support from the State of California. The largest number came from the University of California at Berkeley (9), followed by UCLA (6), and San Francisco State College (5). Seven other institutions and the State Department were also heard from, each submitting from one to four applications. Of these, thirteen have already been initiated and two are now in the process of being negotiated into contract form.

These 15 projects are well distributed. There are five at the University of California at Berkeley—two dealing with the special abilities of students and one each dealing with communication skills of elementary children, retention of students in schools and colleges, and reading skills.

There are four projects at San Francisco State College—three on the education of the mentally retarded and one on retardation.

At Stanford University there are two projects—one dealing with educational theory and the other on school organization and administration.

Single Cooperative Research projects are being carried on in four other locations: State Department of Education—mental retardation; San Jose State College—personality changes in college students; University of Southern California—children who suffer from loss of hearing; University of California at Los Angeles—teacher selection.

The 15 California projects range in length from one to four and a half years. The total amount of Federal support provided for all years ranges from $12,000 to as much as $142,000. All together they represent an expenditure of $636,088 of Federal funds in the State of California for research in education.

California ranks *second* among all States in the number of Cooperative Research projects which have been or soon will be initiated. (It is surpassed only by New York, which has 27.) California ranks *third* in the total amount of Federal funds expended to date.

Now, a word about the philosophy of the Cooperative Research Program. These 15 California projects deal with a wide variety of problems. Five of them concern the education and training of mentally retarded children. The remaining projects, however, all deal with different problems. This raises a question: should we attempt to specify the problems on which research should be done or simply support research which will meet the needs most apparent to those in the field?

This unanswered question is aptly illustrated by the 15 California projects. A third of them probably reflect emphasis placed on the retarded at the national level, even though that interest already existed here. The remaining two-thirds of the projects are sufficiently scattered in content so

as to suggest that they reflect the research interests and competencies now existing in California. In other words, we may assume that while this State has educational problems in common with all other States, it may also have problems which are more or less unique to California. The question then becomes one of the extent to which the Cooperative Research Program should support research in both categories—that aimed at solving the problems in education common to the whole country and that aimed at assisting the regions having unique problems in education.

In setting up our program, we have necessarily concentrated on problems which are nation-wide, but we realize that there are other problems which vary from region to region. In any event, we are, I hope, already helping to meet the needs of the State of California for more research in education.

In closing my comments about the role of the State of California in the Cooperative Research Program, I would like to pay my respects to this Association. The California Educational Research Association is undoubtedly responsible for advancing the cause of educational research, and thus I am glad to tell you what we are trying to do and how we may mutually benefit. Although we are widely separated, we must recognize your resources for leadership in research, and we want very much to work with you in accomplishing what needs to be done.

College Eligibility of Los Angeles City High School Graduates

Digest of Address* by

Howard A. Bowman

Director, Evaluation and Research
Los Angeles City Schools

For several years, follow-up studies of the current activities of former pupils have enabled the Los Angeles City Schools to obtain some rough idea of the numbers and proportions of our high school graduates who had enrolled subsequently in some kind of a post-high school educational institution. The most recent, a study of certain graduates of June 1953, revealed that about 21 per cent of those responding to the questionnaire were attending a college or university and another 27 per cent were attending junior college. An additional 9 per cent were enrolled in some other kind of post-high school educational institution.

*Full report available from Los Angeles City School Districts, Research Report No. 217, November 1958.

During the 1957-58 school year, the matter was approached from another angle. It was thought that it might be even worthwhile to learn what numbers and proportions were graduated from high school with records which made them eligible for such institutions. As a preliminary attempt to determine the problems which might arise in obtaining data about the members of a senior class, schools were asked to classify their January 1958 graduates as to course majors. Data were reported by the schools individually and were compiled by the Evaluation and Research Section.

Since more questions were raised than had been answered, a further investigation was made of the class of June 1958. The June study was designed to determine (a) the major sequences presented by pupils in fulfillment of graduation requirements, and (b) the numbers of graduates, by sex, who met University of California entrance requirements.

It is evident that fewer than half those pupils who were graduated with academic majors had also completed the entrance requirements for the University of California. The total of 1,789 boys and girls who had done so comprised about 14 per cent of the entire graduating class of 12,672, and about 43 per cent of the entire academic major group.

It is also evident that majors in mathematics and science had accounted for 771 boys and 493 girls—nearly 90 per cent of the former and more than half of the latter—among those who qualified for the University of California. It is further noted that the total number of graduates in academic majors was 4,136, or nearly 33 per cent, a very slight increase over the 31 per cent which had been found in the winter class.

It was earlier observed that enumerating those who had graduated in academic majors and had met entrance requirements for the University of California did not tell the whole story. California also maintains a number of state colleges for which the entrance requirement is simply high school graduation with a minimum of 14 units of "A" and "B" marks, exclusive of physical education.

By less stringent requirements for state college admission, the proportion of those eligible jumps from about one in seven of the graduates to more than four in ten. Unfortunately, it is not known what number or proportion of the academic majors who failed to meet University of California entrance requirements also failed to meet state college entrance requirements. However, while there was a total of slightly more than 4,000 pupils who were graduated in academic majors, there were 5,000 eligible for either state college or university. Obviously, at least one-fifth of these eligibles must have come from the ranks of those who did not graduate with academic majors.

School people generally assume that those graduates who complete academic majors are of higher ability (as measured by an intelligence test) than those who do not. From this study it is indeed obvious that, in general,

college-eligible graduates have higher intelligence quotients. The mean I.Q. for the eligibles is something over 108, and for the ineligibles about 97. It has been said many times that the minimum I.Q. desirable to assure success in college is 110. Nearly half of the college eligibles meet this requirement, and another group numbering nearly 30 per cent of the total fall between the "average" I.Q. of 100 and the 110 mark. One wonders, however, about the prospective college success of those eligibles whose I.Q.'s are below 90. Of the 298 so listed, 118, or about 40 per cent, were contributed by three schools.

As has been shown, slightly more than 12,500 pupils were graduated from Los Angeles high schools in June 1958. As a part of a regular program of following pupils after graduation, a sample of approximately one in seven of the graduates was randomly selected. To these graduates were sent letters enclosing postal cards on which the recipients were asked to designate whether they were attending a college, junior college, or university, the number of units in which enrolled, and the name of the institution. By November 1, 1958, slightly more than 1000 replies had been received.

About 70 per cent of the June 1958 high school graduates had enrolled in a collegiate-level institution during the ensuing fall semester. It is this writer's belief that these figures are slightly on the optimistic side, since this percentage of students enrolling in collegiate-level institutions is astonishingly high. Even the approximately 25 per cent enrolled in four-year colleges and universities is greater than expected. It should also be observed that many of those enrolling in junior colleges will later transfer to regular colleges or universities. Data from one junior college indicated that this may be true of as many as 35 per cent of the junior college enrollees. However, two of the seven Los Angeles junior colleges are primarily for technical and business education students, so the true proportion of all junior college enrollees who later transfer to regular colleges or universities is undoubtedly less than the 35 per cent shown for this one junior college.

Four-year collegiate institutions did not attract nearly as many graduates as did the universities, despite the minimal entrance requirements of the state colleges. It is noteworthy, however, that various state colleges accounted for at least half of the four-year college enrollees. Undoubtedly, this figure would have been enhanced had the new Los Angeles State College been accepting freshmen. However, that institution will not enroll a freshman class until Fall, 1959.

The junior college enrollment data indicate clearly that the seven Los Angeles junior colleges exert a tremendous attraction to high school graduates in search of further education. Nearly three-fourths of all the June 1958 graduates who enrolled in a junior college did so in a Los Angeles junior college; and of these, nearly four in every ten enrolled in Los Angeles City College.

Summary

The findings of the several studies which are here combined as one report may be summarized as follows:

1. Among the 4,765 Los Angeles high school graduates of January 1958, 1,511 (31.7%) had completed academic majors.

2. Among the graduates of June 1958, 4,136 (32.6%) had completed academic majors. Of these, 861 boys and 928 girls (or about four in ten) were eligible for University of California entrance, and the balance were ineligible.

3. Mathematics and science majors accounted for most college preparatory graduates, whether eligible or ineligible for University of California entrance.

4. Most girls who were graduated in non-college preparatory majors offered majors in Business Education, and most non-college preparatory boy graduates offered Industrial Arts majors.

5. Among the June 1958 high school graduates, slightly more than four in ten were eligible for either the University of California or a state college.

6. Graduates who were eligible to enter state college had a somewhat higher mean I.Q. (about 108) than did those ineligible (about 97).

7. About 6 per cent of the graduates who were eligible to enter state college had I.Q.'s below 90.

8. Of nearly 1,100 June 1958 graduates who returned questionnaires, nearly 25 per cent were enrolled in a university or college, and another 45 per cent were enrolled in a junior college.

9. Largest numbers of graduates who were attending college as of September 1958 were enrolled in either the University of California, a state college, or a Los Angeles junior college.

The newly-elected officers of the California Educational Research Association are: *President*—Glenn W. Durflinger, Professor of Education, University of California, Santa Barbara; *1st Vice-President*—Floyd Marchus, Contra Costa County Superintendent of Schools, Martinez; *2nd Vice-President*—Leonard Towner, Assistant Professor of Psychology, Long Beach State College; *Secretary-Treasurer*—John G. Caffrey, Director of Research, Palo Alto Unified School District.

The officers were elected at the March Conference and will serve for one year.

Some Implications of Differences Among Colleges in the Abilities of Their Students

Digest of Address by

Harold Seashore

The Psychological Corporation

In America, young people presenting a wide range of ability and a great variety of preparatory education enter our institutions of higher learning. It then follows that the different colleges and different types of colleges attract and admit students who are different in several imortant ways.

A highly selective private college, which takes most of its students from among those who present scores of 600 or more on the College Entrance Examination Board tests, will still show a standard deviation of test scores that is of considerable size. A college in the same state, struggling to recruit what students it can find, may have an average score on a test of scholastic ability which is very low, but its students, too, will show considerable heterogeneity of ability. In between are the great number of institutions, mainly publicly supported ones and the medium-to-large private ones, which attract students over the whole range of abilities.

In developing norms for a new battery of tests designed for use with college freshmen, my colleagues and I have assembled test data on freshmen in about 120 institutions. A factual presentation of these data might stimulate us to think about some of the implications of the inter-institutional diversity in student abilities for problems of curriculum, admissions policies, student personnel activities, and public relations.

The *College Qualification Tests* consist of three subtests: a *Verbal Ability* test, comprised of vocabulary items in synonym and antonym form; a *Numerical Ability* test, presenting computational, process, and reasoning problems from arithmetic, algebra, and geometry, presented with a minimum of words; and an *Information* test, which yields two subscores, one for Science and one for Social Science. Six scores are yielded by this battery: Verbal, Numerical, Information, the Science subscore, the Social Science subscore, and finally, a Total Score. Today we shall be concerned only with the Total Score on the *College Qualification Tests.*

For each of the institutions included in our sample we have computed the mean and standard deviation of the CQT Total Score for its freshmen. To provide a meaningful comparison we have converted each institution's mean score into a percentile rank equivalent, using as a standard the percentile norms for the four-year colleges and universities, these norms being referred to in the Manual as the general norms.

(Dr. Seashore then reviewed a chart of the findings.)

Each *X* in the chart is a summary statement about students in one of the colleges. A quick inspection shows that these colleges enroll freshman classes which differ greatly in ability. Each of the *X's*, of course, represents the average of a distribution of scores. Students in each college are diverse in abilities *within their own college* and students in some institutions show wider ranges of ability than in others. A much larger chart showing the range of CQT scores for each institution could have been presented. We know, of course, that such distributions of scores would show a large amount of overlap among colleges.

As educational researchers we have an obligation to consider the implications of inter-institutional variation in ability levels of students. Surely the goal of American higher education is not to coerce these institutions into identical images of each other. The demand for excellence, for quality, in American higher education is not a demand for uniformity of institutions in goals, curricula, or ability of students. Nor are there any serious voices suggesting that only students in the top tenth, quarter, and third of their secondary school classes should pursue further training. The diversity shown in the chart could be eliminated only under the condition that every institution admit a true cross-section of all students who wish to attend college. However, the problem of diversity then would be entirely within institutions, whereas now there is diversity of ability both among and within institutions.

The problem of quality in collegiate education becomes one of appropriateness of the curricula and the efficiency of teaching for students of different levels of ability so as to induce optimum academic response of the students in relation to their own abilities.

Agreeing that diversity in ability levels is one major characteristic of higher education, we are faced with the problem of undertaking factual studies which will guide each institution to discover how it can become excellent within its own framework of goals, sponsorship, traditions, and diversity of student body.

Look for a moment at the effect of differences in ability levels among colleges on the role of student personnel officers, especially those concerned with educational and career counseling. In general, very superior students can afford to delay their career choices, and probably should do so, until well along in their undergraduate program. Students of lesser ability probably need to choose earlier from the many courses of study which might have precise vocational significance for them. Errors in choice for them will be more serious just because their courses of study tend to be specifically vocational and often of shorter duration.

Another serious concomitant of this diversity of levels of abilities among collegiate institutions is that there probably is a fair correlation between the quality of the faculty and the level of the student body. Colleges which

attract superior students probably tend to command superior scholars and teachers, of course, with notable exceptions in each institution.

It is clear that if quality of education is to mean maximal development of each student, whatever his ability level, the selection and recruitment of appropriately trained teachers for all types of colleges will remain a central concern.

Finally, I should like to note that diversity in ability levels among colleges presents problems to the public relations staffs, to those who blow the institutional horns and hold the budgetary cups. It is hard to explain to constituents and supporters that the goodness of a college arises out of the degree to which it accomplishes its own goals with its type of students rather than out of any standards which are external to it and probably are unattainable.

Brain Biochemistry and Adaptive Behavior

Summary of Luncheon Address by

David Krech

Professor of Psychology
University of California, Berkeley

Scientists at the University of California, Berkeley, have shown for the first time that training produces measurable and lasting changes in the chemistry of the brain—changes which very likely improve the ability to learn.

In experiments on rats, the researchers have found that animals put through complicated training experiences show significant increases in the level of cholinesterase, a brain enzyme, in comparison to control animals which are identical except for their lack of training. The dramatic results could well mean that the use of the brain in solving problems increases its general efficiency.

The experiments were conducted by Dr. Krech, Dr. Mark R. Rosenzweig, associate professor of psychology, and Dr. Edward L. Bennett, research biochemist, as an outgrowth of five years of research on brain chemistry and behavior. During earlier experiments, the scientists showed that cholinesterase (ChE) activity is related to learning ability, and also provided the first demonstration that the activity of a brain enzyme is controlled by heredity.

Although it has been universally accepted that learning must result in some sort of change in the brain, science has sought fruitlessly until now for indications of any lasting alteration in the brain as a result of training.

While many experimenters have been preoccupied with searching for

structural changes in the brain as a result of learning, the U.C. research team approached the problem from the biochemical point of view. It was their belief that an analysis of ChE levels, which provides a summation of the chemical changes over thousands of nerve cells, might reveal a relation between brain chemistry and prior training.

In a first experiment the scientists trained a group of rats for 23 days to solve a difficult maze problem. For each rat run through the maze, an untrained brother sat out the experiment as a control. Upon sacrifice of the animals, the investigators found a significant difference between the two groups in the level of ChE present in the brain, the level being higher for the trained rats.

Realizing that the ChE increase might be due to factors other than training, Dr. Krech and his associates then proceeded to determine whether mere handling of the animals could result in brain chemistry changes. This was tested by handling an experimental group of rats two minutes a day for several weeks, while a control group of littermates was not touched at all. Results indicated that handling had little or no effect.

Also in the 23-day experiment, the trained animals had been underfed in comparison to the control rats in order to motivate them to solve the maze. Underfeeding, when tested by itself, however, proved to cause no significant change in ChE level.

As a result of eliminating handling and underfeeding of animals as possible causes for the increase in ChE activity, the scientists were led to accept the idea that training clearly affects brain chemistry.

In another experiment, a group of rats were given a complete "education," consisting of repeated experience, from the time of weaning on, in a variety of learning situations. They were given toys to play with, platforms and mazes to explore, and burrows to pop in and out of. Again, a control group led the usual restricted cage life of laboratory rats. This time the diets of the two groups were the same. The results of the experiment showed significant increases in ChE activity in the "educated" rats in the areas of the brain controlling both motor and spatial responses, and a fairly good increase in the visual area of the brain, as well.

Since their path of research appears to have great potential value for the understanding of the basic physiological processes involved in learning, the researchers are now planning several experiments to explore even further the relationships they have uncovered.

Some of the questions they hope to answer in the future include whether the brain enzyme level of so-called "dull" rats can be raised, through training, to the level of "bright" rats; whether "dull" rats can profit more than "bright" rats from training; whether there is a limited age at which training is effective; and whether certain types of training are more effective than others.

A Study of Children Who Learned to Read Prior to First Grade

DOLORES DURKIN

Over a year ago, while initiating a research study involving beginning first-grade children, I came across a little six-year-old girl who, without any kind of school instruction, had a fourth-grade reading ability. The wonderfully surprising way in which she could read led me to wonder about the frequency of this kind of precociousness in our elementary schools. And, as inevitably happens, this single question provoked other questions. What kinds of factors, for example, effect this early reading? Are they largely those of intelligence, or of personality characteristics, or perhaps, of special pressures in the home? Looking ahead, I also wondered about the value of early ability in terms of its effect on a child's ultimate growth and interest in reading. Looking to the schools, I couldn't help but wonder whether they are capitalizing adequately and early enough upon a child's ability to learn.

Because a careful survey of the research literature failed to answer these and other related questions, last September I undertook a longitudinal study of children who learned to read prior to first grade, and in a non-school situation.

Procedure

At the very beginning of the fall semester a reading test was individually administered to all of the new first-grade children in a large, public school system. Then, to those children identified as "readers," further achievement tests were given in order to ascertain the actual limits of their reading ability

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Dolores Durkin is Assistant Professor of Education at the University of California, Berkeley, a position she has held for two years. She obtained her Masters degree from the University of Illinois and her Ph.D. degree from the same institution in 1957. Her undergraduate work was done at Chicago Teachers College and Loyola University. Dr. Durkin presented the above article at the California Educational Research Association meeting on March 14, and plans to present a detailed account of the first year of the study as a Monograph later this year. It is the author's intent to continue the study of these children at least through the sixth grade.

prior to first-grade instruction. As a third step, each of the selected children was given a Stanford-Binet Intelligence Test. Later on in the year, at the end of both the first and second semesters of first grade, reading achievement tests will again be administered in order to establish the progress of the children in reading during this one-year period. Such progress, it is planned, will then be compared with that made by children having comparable intellectual ability and comparable school instruction, but who had had no ability in reading at their entrance into first grade. During the course of the year the parents of subjects were interviewed for the purpose of examining the family backgrounds, as well as the particular ways in which the children had actually learned to read. Teachers and principals are also to be systematically questioned about the way(s) in which they have—or perhaps have not—attempted to utilize and enhance this precocious kind of learning. And, finally, the children themselves will be interviewed in order to ascertain their attitudes toward school in general, and toward reading in particular.

It is on data from the first semester of this study that I am reporting.

Last September, during the first two weeks of the fall semester and with the aid of eight assistants, 5,103 first-grade children were individually asked to identify a list of 37 words which had been chosen as being common to the pre-primers of three different basal reader series. This group of children represented 97 per cent of the first-grade population made available in a large, public school system here in California. Any child who had been given any reading instruction in kindergarten was eliminated before the selective process began.

Using an ability to identify at least 18 of the prescribed words as the criterion for selection, a group of 49 children—29 girls and 20 boys—ultimately became subjects in this study. Fifty-three per cent of the group were Caucasian, 24 per cent were Negro, and 22 per cent were Oriental. It was also noted that six in the group, or 12 per cent, were left-handed.

Once identified, these 49 children were given—and this was still within the first two weeks of first grade—the Gates Primary Word Recognition Test and the Gates Primary Paragraph Reading Test. Their scores on the Word Recognition Test, according to grade norms, ranged from 1.3 to 3.7. The mean of these grades was 2.3, and the mode was 1.6. On the Paragraph Reading Test, scores ranged from 1.3 to 4.4. The mean was 2.1, and the mode was again 1.6.

Seven of the children, because of their particularly high achievement in the primary tests, were also given the Gates Advanced Word Recognition Test and the Advanced Paragraph Reading Test. Their scores on the first now ranged from 3.2 to 4.7; and on the second, from 2.8 to 6.0.

One, of course, immediately wonders about the intelligence of six-year-old children who begin first grade with, at least in some instances, a truly

remarkable ability in reading. When given the Stanford-Binet Intelligence Test, the 49 subjects in this study emerged with IQ's that ranged from 91 to 161, the mean being 122; and the mode, 109. It was interesting to note, incidentally, that the average of the two reading scores obtained by the subject having an IQ of 91 was 2.9 while the average for the subject with the 161 IQ was just 2.8. Looking at the group of 49 subjects as a whole, the correlation between IQ and average reading score was actually +.39.

Family Background

Once the reading tests and intelligence tests were administered, attention was turned to the matter of interviewing parents. For this, a seven-page questionnaire had been constructed for the purpose of examining, in detail, the family background of the children as well as the way in which each had learned to read. The interviews lasted all the way from one hour to two and one-half hours, and they were interesting as well as enlightening. Both the mother and father were present for 11 of the interviews, while for the other 38 only the mother was available either because the father was working at the time of the interview, or—as was true in five cases—because the parents were divorced. As would be expected, a vast amount of data accrued from these home interviews, but I will mention only what seems most relevant.

Using Warner's I.S.C. Scale to determine the social-class status of the families, findings from the interviews indicated that 7 of them could be classified as upper-middle class, 15 as lower-middle class, 26 as upper-lower class, and 1 as lower class. Here it could be said that, on the whole, the higher ranking families in the group had heard the school-man's admonition, "Don't try to teach your child to read"; and they were almost apologetic because, in various ways, their child *had* learned to read. In the case of families from the lower strata, no apology was made and, in fact, early reading ability was seen as a way of "getting a good start" for better things to come.

Interview data also showed that 10 of the 49 families involved in this study were bilingual. For seven of them the second language was Chinese; for two it was Spanish; and for one, German.

Family size ranged from one to seven children, the average number being 3.1. Three of the children in this study were singletons, and six were the oldest of the children in their families. The other 40 had at least one older brother or sister. It was common to find among these 40—actually, this was true for 28 of them—the presence of an older brother or sister who would have been entering the first grade, and therefore beginning to learn to read, when these children were three, and four, and five years of age.

And this suggests, of course, sibling influence as a factor in their early reading ability.

According to interview data, sibling influence was the sole factor in the case of 8 of the children, and for 14 more it was mentioned as being one of the factors. Actually, help from the mother turned out to be the most common source of learning. In the case of 19 of the children, it was the only source, and in the case of 18 others it was one of the sources. Help from the father, a grandmother, a cousin, even the lady next door and a child down the street were other kinds of factors that added to the learning.

Regardless of the particular source of their learning, all of the children —again on the basis of parent-interview data—were children who had been read to extensively before entering school, and who had storybooks of their own ranging in number from five to approximately 200. They were children who had been curious about words in books, in newspapers, on TV screens, on signs and billboards, and on cereal boxes and canned goods. But most of all, it seems, they were children who had had someone who was willing to try to satisfy their curiosity. When this willingness was that of a parent, it usually manifested itself in actual instruction, very often phonetic, and ranging in degree from quite incidental help to instruction that was both methodical and regular. In some instances, though, parental help was given only in the form of answering questions, and providing an abundance of materials such as pencils and paper, alphabet books, coloring books, and school-like workbooks. When the willingness to help was that of a sibling, it was almost always displayed by "playing school" with the younger child. The sibling, to be sure, was the teacher, and her "classes" were held sometimes every day but, in other instances, "only on rainy days." In quality, these school-sessions at home seem to have ranged from a light-hearted concentration on drawing, printing, and coloring to one that involved flash cards, the development of phonetic word-families, and even homework and chastisement.

Value of Pre-School Reading

An important question, of course, concerns the *ultimate* value of all of the various kinds and degrees of pre-school instruction in reading. Because the present study is just beginning, it has also only begun to try to suggest an answer. The one step taken, thus far, is the administration of reading achievement tests at the end of the subjects' first semester in first grade—except that at the end of this semester, which was in February, the subjects weren't always to be found in first-grade classrooms. Thirty-seven *were*, but of the other eleven, four were in first grade but were reading with second-grade children; one was in first grade and reading with third-graders; two were in classrooms that combined first and second grade and were

reading with the best of the second-grade children; and five others were full-fledged second-graders.

What did the group of 49 look like now, as readers? Because of the variety of their reading abilities, a variety of reading tests was given in February. The four used in September were included, as well as the Gates Survey Test which is designed to evaluate speed, vocabulary, and comprehension, and which is more difficult than any of the other four.

Results of this testing showed that individual reading scores of the 49 children now ranged, according to grade norms, from 1.6 to 6.5. Using average scores rather than individual scores as the basis for description, the range was 1.7 to 5.4 with a mean of 3.1 and a mode of 2.5. The over-all correlation between IQ and obtained reading scores was found to be +.64. It was also found that the average gain in reading ability made by the subjects, over this period of a semester, was eight months. The greatest single gain, however, was two years, one month. This gain was made by two different subjects having an IQ of 151 and 160 respectively. Least improvement was shown by a subject whose reading ability—at least on the basis of these tests—regressed two months. Her IQ was 108. For the total group of subjects, the correlation between IQ and increase in reading scores for this period of a semester turned out to be +.59.

Summary

Obviously, because this study is still in its initial stage, no valid or dramatic conclusions can be drawn, at this time, concerning early ability in reading and its effect on ultimate ability and interest. Even at this stage, though, it suggests an important kind of precociousness in our schools which, at least in the realm of research, has been neglected up to now. It is my hope, certainly, that with time this study will not only emphasize it but that it will also be able to answer important questions about it.

DIGESTS OF RESEARCH PAPERS

Alphabetical in each section according to the authors

I—ADMINISTRATION

People, Children, Dollars and the Public Schools—Hubert C. Armstrong and Frank Farner, Claremont Graduate School.

This report is a brief summarization of Chapters 8 and 9 of *California Local Finance: Trends, Prospects, Standards,* a research study prepared under the auspices of the Claremont Social Research Center.

Extracted are passages from the "Summary of Findings and Statement of Recommendations for More Complete Equity and Efficiency in the Financial Support of Public Education in California."

The Summary deals with current costs, per cent of income spent on support of education, revenues (state aid), and other fiscal problems. The recommendations indicate means by which the effectiveness of both state and local tax bases may be increased, the efficiency of all tax revenues improved, and higher educational standards effected for all children in the state. These recommendations can be roughly categorized as regarding (1) administration, (2) fiscal measures, (3) further research, and (4) funds for capital outlay.

A Survey of State Laws and Regulations Regarding Corporal Punishment in the Public Schools—Frances Coolidge, Santa Cruz.

State laws and regulations regarding corporal punishment in the public schools of the United States were studied, with information obtained from all 48 states and the District of Columbia.

The findings indicated much variance among the states in their laws, rules, and regulations on this subject. In fourteen states authority for use of corporal punishment stems from court decisions. Sixteen states have no existing legislation on the subject, although some of them have opinions from attorneys general. Other states: prohibit corporal punishment; specifically authorize it; have state laws which place the teacher *in loco parentis;* have State Board of Education regulations; are regulated by assault and battery laws which do not give authority to use corporal punishment; or imply the use of corporal punishment by making violence lawful in case of moderate restraint or correction of a child.

The study points out the liabilities of a school employee as they relate to corporal punishment and the responsibilities which must be assumed by a teacher who inflicts such punishment, as well as the differing interpretations of what constitutes liability for excessive punishment.

The study concludes with recommendations for legislation in the State of California and recommendations for rules and regulations of the California State Board of Education.

Research Methodology for the Analysis of State School Finance Trends—Frank Farner, Claremont Graduate School.

Two topics from a study on *California Local Finance: Trends, Prospects, Standards,* are presented for detailed analysis in this paper. The topics are, "The Effect of Changing Elementary-Secondary Enrollment Ratios on Total Current

Expense of Education," and "An Identification of Factors Which Have Contributed to Increased School Costs in California, 1929-30 Through 1956-57."

A formula is given which is designed to isolate the impact of changing enrollment ratios from the other factors which affect school costs. It specifically determines the change in total cost resulting from a change in the proportion which elementary school represents of total enrollment from one time to another.

Of the factors contributing to increased school costs (including capital outlay) over the 27-year period between 1930 and 1957, increased ADA and inflation were most significant. Within these factors, components such as increased family size were additive. As large as present school costs have become, however, the proportion of State income devoted to supporting these costs has remained at levels attained in 1929-30 and 1939-40 when the proportion of total population in school was much lower.

Relationships Between Local District Unification in California and the Financial Support of Public Education—Daniel K. Freudenthal, Berkeley Public Schools.

This report, the summary of a doctoral study in Educational Administration, analyzed selected relationships between unification of local school districts in California and the state program of financial support for the operating expense of public education.

Central to the study was the principal apportionment of the state school fund of 1955-56 to hypothetical unified districts. Probable effects of such unification on fiscal problems were closely studied and a number of recommendations for immediate action and for further study were made, based on the findings.

The Use of Punched Cards in High Schools for Pupil Personnel Records and Services—Allen J. Gruman, Kern County Union High School District, Bakersfield.

This study was designed to determine whether the use by high schools of punched cards for test records, student registration, and grade reports was valuable as well as economically sound. Only those districts that used the machines for pupil personnel records in their individual high schools were included in the study.

It was found that twenty-eight high schools or high school districts in the United States made some such use. Detailed questionnaires were received from twenty of these and were evaluated to determine the benefits derived and assistance received from the machines.

It was concluded that while punched card pupil accounting systems had not been used widely in the schools, successful machine operations clearly had been achieved in six phases of pupil accounting: class scheduling and registration, report cards, cumulative records, test records, attendance reports, and statistical reports and lists.

Districts were not making full use of the data contained in the cards. However, the great speed and accuracy gained in using machines were noteworthy, and these factors, coupled with the additional services obtained, more than justified the additional expense required for installation. The cost of installation was not considered excessive; what increase there was could be considered offset merely by the additional instructional time made available to students as a result of the reduction of teachers' clerical tasks. Also, reduction of clerical personnel was possible after an initial period of adjustment.

A high school with an enrollment of 1,000 could justify the installation of punched card records; a high school district with a minimum enrollment of 5,000 could justify the rental of a full complement of machines. The personnel problems resulting from the change-over to machines could be and were being adequately resolved with careful orientation methods.

The Influence of Class Size Upon Instructional Effectiveness in a College Course—James D. Lucas, Sacramento State College.

The hypothesis upon which this study was based was that the larger the class size in a college course, the less would be the instructional effectiveness. The measure of instructional effectiveness used for Humanities 1A at Sacramento State College in the fall semester of 1955 and 1956 was the grades of students in the sequel course, Humanities 1B, corrected for the students' cumulative grade point averages.

The instructional effectiveness was greatest for class size 1-20, and next highest for class sizes 21-40, 41-60, and 61-80, in that order, thus supporting the hypothesis with an F ratio significant at the 5 per cent level of confidence using a single tailed test.

The Cost Structure of School Districts—A High Speed Mass Data Method —Frank Yett, Pasadena City College.

Much pertinent data with which adequately developed cost structures could be computed are not being collected generally, but such sources as the state-aided construction program, state and county level departmental demography, and the filed budgets of school districts are an untapped reservoir.

This report discusses the development of a multi-dimensional costs construct compatible with high-speed mass data methods. Expenditure data for districts could be drawn from "Financial Transactions Concerning School Districts of California" (State Controller), and "Average Daily Attendance and Selected Financial Statistics of California School Districts" (Department of Education), but a more suitable methodology was suggested by the writer in a paper given at the 1958 meeting of the C.E.R.A.

The procedure, including a suggested design and a structure analysis, should provide the tools necessary for financial management of school districts in the development of equalization and other aid programs, as well as budgetary control under cost standards which reflect a broad spectrum of identifiable characteristics.

II—CHILD STUDY

Brain Abnormalities in Problem Children — William T. Grant, M.D., Pasadena.

A large proportion of children who are classified as "problem children" have an organic lesion of the brain and in most cases a rather exact diagnosis of this can be made using X-rays of the skull and, in some cases, air encephalograms.

In the majority of these children the abnormalities affecting the brain are similar to those found in children with cerebral palsy, with the difference being a matter of degree of abnormality. The organic changes are found primarily in the membranes, fluid spaces, and blood-vessels over the brain; gross changes in the brain itself are much less frequent.

Surgical procedures applied to the brain have been discovered to be effective in about 80 per cent of cases, including some severe disturbances.

Children, then, who present exceptional problems in the classroom should be regarded first as having an organic disturbance before looking to causal factors in home environment.

Personality Factors Related to the Underachievement of Bright Students—James W. Grubb, Hillcrest School, Concord.

The purpose of the study was to investigate the relationship of hostility and

underachievement of bright tenth-grade students. A student was designated as bright if his score on the Test of Primary Mental Abilities had placed him at or above the 75th percentile in comparison with the total class of 412 students. The classification of Achievers and Underachievers was based on grade point average.

Each of the eighty subjects was administered four personality scales, three of which were specifically labelled as measures of hostility, and a fourth which has often been referred to as such. These were the Bell, Cook, Guilford, and F Scales respectively.

After scoring of the scales, analyses of variance were applied to obtain information regarding significant differences between male and female Achievers and Underachievers.

The results suggest that hostility is a more pronounced characteristic of bright male Underachievers than of bright male Achievers. While the fact that ability test scores indicating a significant difference between female Achievers and Underachievers would make it unsafe to draw conclusions, there is still evidence to suggest that male and female Underachievers do not respond in similar ways to hostility items.

The data suggest that underachievement is not normally a problem which is manifest in the educational framework, but rather one which the Underachiever brings with him when he enters high school (or earlier). This being the case, demands for more and/or better work from such students are likely to have undesirable results.

Preliminary Report of a Project for Neurologically Handicapped (NH) Children—John W. Howe, Los Angeles County Schools.

The project was aimed at determining means for providing adequate public education for the neurologically handicapped child.

Approximately 130 NH children meeting certain diagnostic criteria were randomly divided, half receiving education in small special classes, the other half in regular classes, for a two-year period. They were compared as to (1) school achievement, (2) school behavior, (3) personal adjustment, (4) teacher effort, (5) administrator effort, (6) parental effort, (7) medical effort, and (8) financial costs.

Fifteen cooperating school districts, with aid from county and state agencies, spent a year in planning, adopting criteria, and testing and processing children. Admissions were passed by a review team of five specialists, and classroom conditions were made as optimal as possible for both groups. Classes began in September 1958 and will end June 1960, until which time no conclusions regarding the success and findings of the project will be available.

This report attempted to suggest some preliminary indications of the study.

Comparison of Maturity, Structural, and Muscular Strength Measures for Five Somatotype Categories of Boys Nine Through Fifteen Years of Age—Robert N. Irving, Jr., Sacramento County Schools.

This study is one of a series of master's theses and doctoral dissertations completed at the University of Oregon as a result of the Medford, Oregon Boys' Growth Study. Its purpose was to relate the physique types of 259 boys aged nine through fifteen to their physiological maturity, structural characteristics, and muscular strength.

Somatotype appraisals of the subjects were made from photographs taken according to conditions standardized by Sheldon for somatotype photography. The boys were placed in five categories: (1) Endomorph; (2) Mesomorph; (3) Ectomorph; (4) Endomesomorph; (5) Mid-type (no predominant shape component).

All subjects were tested by maturity, anthropometric, and muscular strength

measures. Mean scores of boys in each of the five categories were compared by use of the *t* ratio which was also used to compare scores of boys at the upper and lower quarter of the distribution in five selected fundamental measures. Finally, the boys' somatotype distribution was compared with that of the adult male population found in Sheldon's *Atlas of Men* by means of chi-square analysis.

Forty-eight of the eighty-eight male somatotypes identified by Sheldon were found in this study. Somatotype distribution was also similar to Sheldon's. Statistically significant differentiating characteristics among the five categories were found and the various measures used were evaluated for their effectiveness in producing differentiations.

Reading Behavior, Achievements and Attitudes of First Grade Boys—Daniel E. Johnson, Alameda County Schools.

By means of a specially devised rating scale, the attitudes toward reading instruction of 101 undifferentiated first grade boys were determined, and a separation made into Eager and Reluctant groups. At the end of the first grade all subjects were administered the Gilmore and Wide Range Reading Tests, and were further asked to tell projective stories about nine pictures of reading situations.

Analysis of the projective tests showed that Eager and Reluctant readers possessed certain attitudes peculiar to each group and also a number that were common to both groups. Later it was found that while the two groups were similar in intellectual ability, the Eager clearly outperformed the Reluctant in all areas of reading achievement. The gap remained or widened when the Gilmore and Wide Range were repeated in the second grade.

The findings of the study suggest the possibility of early prediction of reading difficulty and indicate that children should be grouped for primary reading instruction on the basis of attitude, and that teaching methods should differ for eager and reluctant boys.

It is evident from cross-validation study and other checks that the reading behavior and attitudes of first-grade students which so affect their eventual performance can be rated reliably. From this fact there arise implications of considerable relevance to educational processes.

Personality and Adjustment Characteristics of Obese High School Girls—D. A. Leton, University of California, Los Angeles.

This study, one segment of an experiment aimed at evaluating group methods of health instruction for overweight girls, attempted to define the personality characteristics shown by these girls at adolescence. On the basis of the revised Wood-Baldwin height-weight tables, 42 girls who were 15 or more pounds overweight were screened out of the entire student body of a four-year high school.

Three personality tests were administered and analyzed. These were as follows: (1) The Minnesota Counseling Inventory; (2) The Rogers Test of Personality Adjustment; (3) The House-Tree-Person Projective Drawing Test.

The personality measures failed to disclose any typical modes of adjustment or pre-existing patterns of personality. This could be attributable to the inconsistency in the personality traits displayed by the subjects or to the insensitivity of the instruments used to measure these traits.

It was also concluded that overweight is not inevitably harmful to the adjustment of adolescents, and is, more often than not, an aberration of physical development rather than the effect of psychological difficulties.

Identifying Emotionally Disturbed Children at Fifth and Sixth Grade Levels—John MacRae and Eva Hershbach, San Jose State College.

This study was undertaken in the Cupertino Union School District for the

purpose of determining whether an incomplete sentences blank could be used as a screening device to identify emotionally disturbed children in the classroom at the fifth and sixth grade levels.

The investigators developed a scoring system whereby the number of negative (disturbed) and positive (healthy) responses could be rated for each subject. By observation of teachers, principals, and special teachers, the subjects were then divided into two groups—emotionally disturbed and healthy.

A Behavioral Characteristics Rating Scale was devised to check the accuracy of this division. The components of the scale were evaluated as being characteristic of positive or negative academic, social, or personal behavior. Subjects' scores were totaled in terms of these categories, and a comparison of the two groups made. The ratings on the scale were found to be in general agreement with the selection of the subjects through observation.

After two investigators had scored the IS blanks independently without knowing to which group each child belonged, analysis revealed that the results were not significantly related to either the original observation selection or to the rating scale.

It was concluded, therefore, that although the Behavioral Characteristics Rating Scale had possibilities as an effective device to corroborate observation, the incomplete sentences technique was not adequate as a device to screen emotionally disturbed children at the fifth and sixth grade levels.

The Orinda Vision Study—Henry B. Peters, University of California, Berkeley.

A three-year longitudinal study of the vision status of more than 1,000 elementary school children in the Orinda School District was completed in 1956.

Many different screening procedures were compared with one another and against clinical examinations and clinical criteria which were established from the study results and which were generally in agreement with professional opinions as determined in a nation-wide questionnaire.

The Modified Clinical Technique, consisting of a variable series of tests and measures, was found to be remarkably efficient and economical and had the fewest number of over- or under-referrals.

A number of recommendations based on these results were given for conducting satisfactory elementary school vision screening.

A Longitudinal Study of the Consistency of Behavior Between Three and Ten Years—Samuel R. Pinneau and Harold E. Jones, Institute of Human Development, University of California.

Ratings of a number of different kinds of behavior of nursery school children were related to behavioral and achievement ratings made on the same subjects when they were in the first, third, and fifth grades. Ratings on 61 dimensions of behavior were obtained for 138 children for each year of their attendance at the Institute Nursery School. Follow-up studies were made on most of the children in the elementary grades.

The number of variables in the preschool years was reduced by centroid factor analysis, with six new, inclusive factors being effected. These factors are concerned with: (1) Sociability; (2) Emotional make-up; (3) Achievement; (4) Anxiety; (5) Attention-getting; (6) Delinquency.

For the elementary school data, scores were computed using the Nursery School factor loadings. The subjects tended to maintain their same relative standing in the preschool and elementary school years for the emotional, anti-social, and attention-getting dimensions. Little or no consistency was found for the other factors, however.

Analysis of the Responses of Pupils Classified as Retarded, Average or Advanced Readers to Learning Situations Involving Oral Interpretations of Identical Story Material—Mildred C. Robeck, University of California, Santa Barbara.

Three experimental reading lessons containing identical story material were presented to 28 students who comprised a fourth-grade class at Seward School, Seattle. These students had been divided into three groups, classified as retarded, average, and advanced readers, according to criteria such as the *Stanford Achievement Tests, California Short-Form Test of Mental Ability,* and teacher appraisal.

Reading time for each student was recorded, and similar discussion questions designed to test interpretation on factual, fantasy, and value judgment levels were submitted to each group.

Performance was evaluated according to the reading time required and the maturity of interpretation attained. It was found that, in spite of differences favoring the less advanced in the kind and amount of teacher help given, the advanced group clearly outperformed them both in speed and quality of interpretation. By the same token, the average group generally did better in both areas than the retarded.

From these data it was concluded that reading level placements based on standardized tests were highly indicative both of the reading rate and the level of oral interpretation that might be expected of retarded, average, and advanced readers. However, it also was apparent that standardized tests designed specifically to assess silent reading ability were not useful in predicting student ability to interpret implicit meanings.

III—EDUCATIONAL PSYCHOLOGY AND LEARNING THEORY

Oral-Aural Differentiation Among Phonemes as a Factor in Spelling Readiness—H. Frank Bradford, Lafayette School District.

The study was directed toward the construction of an oral-aural discrimination test which would distinguish reliably among beginning second grade children in their ability to discriminate among regularly spelled speech-sounds which occur in words of the first and second grade level.

A 112-item preliminary speech-sound discrimination test representing 49 speech sounds was administered to 168 first grade and 168 second grade children. The words were chosen from Moore's "Tabulation Sheets for Each Phoneme" according to criteria established for the test. The selection of the thirty-six best items of the original 112 items was based upon a comparison among the items of the ratings assigned to the five component responses of each item. Pupil test scores on the 36-item test were correlated with pupil mental ages obtained by administering the California Test of Mental Maturity. The low correlation of scores which were demonstrated indicated that the test produced by this study measured an ability quite different from that measured by the California Test of Mental Maturity. The study demonstrated that young children differ in their ability to discriminate among speech-sounds and that not all beginning second grade children have readiness for discriminating among all regularly spelled speech-sounds.

Estimation of 'Learning' as a Function of Measured Ability—John Caffrey, Palo Alto Unified School District.

This paper presents: (1) an extension of the method of estimating "true gains"

of an examinee, as measured by parallel tests given before and after a learning interval, to include information relative to the ability of each examinee; and (2) suggested methods of comparing group gains when related data are available for the examinees.

Teaching Sixth Grade Students to Make Predictions From Reading Materials—Charles M. Clark, Stockton Unified School District.

Twelve superior sixth grade classes were selected for this study for the purpose of determining whether students in that grade can improve in making predictions from reading materials which were designed specifically to give experience in this activity, and to determine some of the relationships between intelligence, reading comprehension and vocabulary and the ability to make predictions from reading materials.

Six classes comprised the experimental group and the others, matched for intelligence, reading comprehension, reading vocabulary, and the ability to make predictions, served as a control group. Twenty-three self-explanatory lessons were given to the experimental classes at the approximate rate of three per week. Accompanying the lessons was a teacher's manual which suggested methods of conducting the discussion which followed each lesson. The control classes were taught for the same period of time from materials and by methods selected by the teachers. Upon completion of the lessons, the students were tested in comprehension, vocabulary and the ability to predict from reading materials.

Although the limitations of the study are defined, the conclusions demonstrate that the experimental group had a statistically significant gain in the ability to make predictions as measured by Gates' test on predicting outcomes from reading materials. The relationships between intelligence, reading comprehension, and vocabulary and the ability to make predictions from reading materials are indicated in this study, as well as comparisons of the Clark and Gates tests as they relate to those factors.

The Development of Understanding in Arithmetic by a Teaching Machine—Evan R. Keislar, University of California, Los Angeles.

This study explored the possibility of using a multiple-choice machine method of teaching "understanding," by which is meant the ability to answer a variety of questions different from those encountered during training but belonging to the same general class. The specific objective was to teach an understanding of rectangles, using as subjects 14 experimental and 14 matched controls selected from the fifth and low sixth grades by means of a pre-test. The machine used was an extensive adaptation of the Film Rater used by the Navy for teaching aircraft identification. Multiple choice items were projected in sequence upon a viewing plate. The subject responded to each item by pressing one of five buttons. With a correct answer a green light turned on and the next item was brought into view. A red light came on for an incorrect answer. The learner had to answer correctly before proceeding. A special device recorded a graph of all errors and right answers. A total program consisted of 120 items, the first ten of which were instructions and the remaining 110 constructed to provide a sequence beginning with concepts of squares and rectangles and ending with two-step problems.

Twelve of the fourteen experimental subjects showed greater gains than did the controls; one showed less gain. The graphic record indicated several weaknesses in the item set; for example, for most subjects it was too difficult. Wide individual differences were apparent even among those with similar intelligence and reading ability. The conclusion was that the use of this multiple-choice machine method of teaching can promote an understanding of arithmetical concepts in comparison with no planned instruction.

The Effect of Stimulus Cues in Written Problems on the Problem-Solving Process—Bert Y. Kersh, University of Oregon.

The study was related to previous research published by Buswell, Kersh, Monroe, and others, indicating that the initial stage of reading and interpreting written problems is crucial, and that success or failure in interpreting written problems correctly is more related to skill in problem-solving than to skill in reading for comprehension.

The problem was to determine the influence on the problem-solving processes of college level and seventh-grade level students of (1) the quantity of background information, (2) the quality of the background information, and (3) the sentence structure used in written problems.

Three reasoning problems were used, each of which was presented in three different ways in terms of one of the experimental variables. Thus, three experimental groups labeled groups A, B, and C were formed at each level of schooling. Between group comparisons were made of the *Ss* performance.

The results indicated that the *sentence structure* and the *quality* of information can appreciably affect the thought processes of *Ss* solving written problems in a predictable manner, but that the influence of the *quantity* of information provided may be subordinate to the other two variables. The results were more apparent with the younger group.

The following conclusions were made: (1) a systematic study of the influence of stimulus variables such as those studied in the present study is warranted, and (2) less mature persons are influenced more by the stimulus materials than are more mature persons.

Progress of Retarded Spellers—Ida E. Morrison, Sacramento State College, and Ida F. Perry, San Joaquin County.

The results of achievement tests of pupils in grades III through VIII were analyzed. The children who scored in the lowest 15 per cent were selected for study. Their records were followed from two to four years and intelligence test scores obtained. The children were divided into four levels according to their I.Q.'s: Level I, 90 to 110; II, 80 to 89; III, 70 to 79; and IV, below 70.

The children were retarded in spelling as follows: Level I—19 months; II—23 months; III—31 months; IV—36 months. In each level the least average retardation was found in the third grade and this average increased as the pupils advanced from grade to grade. The highest average months retardation was found in the sixth, seventh, or eighth grades.

The average yearly gain per child was computed. On all levels this gain was found to be more than twelve months in the third and fourth grades and decreased very rapidly as the children advanced through the middle grades. The average yearly gains in months was found to be almost the same regardless of intelligence level, with the exception of the very lowest group where the greatest gains were found.

Spelling and Reading Relationships with Incidence of Retardation and Acceleration—Ida E. Morrison, Sacramento State College, and Ida F. Perry, San Joaquin County.

The first purpose of the study was to measure the relationship between spelling and reading achievement in grades III through VIII and to discover if there is a trend for correlations to be higher on the primary than on the intermediate level. Achievement scores for 1,007 cases were correlated. It was found that spelling and reading correlations were highest in grade III at .85 and gradually decreased to .75 at grade VIII.

The second problem was to discover the trends in retardation and acceleration in spelling compared to the same trends in reading on various grade levels. Chil-

dren who were retarded below the first standard deviation in reading and spelling were compared to those accelerated to the same extent, and changes compared as they progressed. I.Q. scores were tabulated, and a description of teaching procedures was secured. The findings were as follows: Intelligence test scores were slightly above the national norm. The percentage of retardation in spelling and reading was larger than expectation, and the acceleration was smaller. The highest percentage of retardation and the lowest acceleration were found in reading (an average of 26 per cent below sigma and 9 per cent above sigma). The primary children were nearly average in distribution. The greatest extremes were in grades V and VI. The best teaching procedures were found in grades III and IV, and the poorest were found in grades V and VI.

A Study of the Effect of Special Work for Gifted Non-Motivated Students at the Eighth Grade Level—John A. R. Wilson, University of California, Santa Barbara.

Fourteen 8th grade students with I.Q. scores at or near 130 who had obtained few, if any, A grades during 7th grade were grouped as a class. They were provided with highly effective teachers for English, social studies, science and mathematics. In all classes except mathematics they were part of a larger group of capable students. Direct attempts were made to increase the students' levels of aspiration and their self-concepts. Parents were informed and their help solicited.

Three of the students (22 per cent) had straight A grades at the end of the first semester of grade nine. Several of the students who did not improve materially were identified as having problems not reached by the design of the study but possibly susceptible to salvage by other techniques. The success of the project encourages hope that segregation of and specially beamed work for gifted non-motivated students can lead to performance on the high level of which they are capable.

IV—PERCEPTION OF SELF AND OF OTHERS

A Continuation of a Pilot Clinical Study of Changes in Self-Concept of Retarded College Readers at San Jose State College as Indicated on a College Reading Inventory—Charles C. Coffey and Margaret Ann Blair, San Jose State College.

The present study is a continuation of a descriptive investigation started in September 1957 at San Jose State College which was designed to determine changes in the self-concept of retarded college readers enrolled in remedial reading courses.

The Revised College Reading Inventory was administered to 207 retarded college readers. Students checked the inventory at the beginning and end of their remedial Reading A course.

The items in the inventory were classified into two categories, (1) Reading-Study Skills and (2) Attitudes-Personal Adjustment. Tallying was done in terms of these categories and percentage of decline or increase was computed for specific items as well as for the two groups. An r was computed by means of the sign test and tested for significance.

Results of the sign test indicated that differences for both categories were significant at better than the .01 level of confidence, from which it may be concluded tentatively that the self-concept of the subjects used in the study was significantly altered after a semester enrollment in a course in remedial reading.

Both this quantitative study and the 1957-58 clinical study point up the need of a greater awareness of the importance of the self-concept of the retarded college reader for both student and instructor.

Self-Appraisal of Advanced Degree Candidates—Willis N. Potter, College of the Pacific.

The problem of this study was to discover to what extent candidates for post-baccalaureate degrees in the graduate school of an independent college considered that they possessed certain characteristics, abilities, and attitudes commonly thought to be valuable to the scholar and research worker.

Subjects were 402 students in the 16 sections of a research techniques course given over approximately a ten-year period. Use was made of the *Score Card for Fitness for Graduate Study* developed by C. E. Seashore, which provides for the scoring of ten traits, attitudes, and abilities. Self-evaluation ranges along a six-point scale from "very poor" to "superior."

The students were asked to appraise their own qualities in comparison to those of other prospective graduate candidates whom they knew, with reference also to the relative importance and value of these qualities.

Analysis of the data indicated that the advanced students gave themselves generally high ratings with respect to moral attitudes, health, and cooperation. Memory, originality, and application held conspicuously low ranks. The students seldom found among their traits a brilliant and creative imagination or a facile command of facts. They also generally doubted their powers of concentration.

On the whole, the subjects thought themselves comparatively well-fitted for graduate study and research as far as their ethical and physical qualifications were concerned. On the other hand, they seemed to feel considerably less secure regarding their intellectual adequacy.

Accuracy of Self-Perceptions in Elementary School Children — Pauline Sears, Stanford University.

The present study, part of a larger long-term investigation of classroom conditions and their effects on achievement and self-esteem motivation, reports a portion of the data relating to accuracy of self-concept in ten areas potentially relevant to self-esteem.

The questions to which these particular data are directed are as follows: (1) Are self-concepts generally related to outside measurements in the same areas, such as peer and teacher ratings, and test and observation scores? (2) Are there discernible differences in *areas* of self-esteem with reference to the accuracy of self-perception? and (3) What appear to be the relative potencies for prediction of self-concept of the various outside measures?

After the instruments of self and outside appraisal were administered to two fifth and sixth grade classrooms, correlations were run between the two categories of evaluation. It was found that self-concept and outside measures of ability were significantly correlated in the large majority of relationships tested, with the relationship closest in the areas of mental ability, work habits, and school achievement. Also, it was evident in some instances that peer and teacher ratings were as closely related to self-concepts as the more objective test and observation measures.

It was concluded that children, while varying widely in ability, generally have realistic ideas of their own talents as perceived by others or as measured by test. This is particularly true in the area of academic achievement.

Some Correlates of Prejudice Toward Negroes in Elementary Age Children: Satisfaction with Self and Academic Achievement—B. Robert Tabachnick, San Jose State College.

The purpose of this study was to examine the following as possible correlates of prejudice toward Negroes in elementary age children: satisfaction with self in each of ten categories of personal and social behavior, academic achievement, and sex.

Three hundred and two Caucasian children—151 boys and 151 girls—attending the fifth grades of six elementary schools in a suburban community in the San Francisco Bay Area, were studied. These children probably had had very little contact with Negroes for the two years prior to the study.

Teachers administered the Gough, Harris, Martin, and Edwards prejudice index in order to obtain a measure of each child's degree of prejudice toward Negroes. Children's responses to a self-concept inventory measured the extent to which each was satisfied with himself in critical areas of personal and social behavior. Responses to these two instruments were correlated, and further analyses were made.

Among the conclusions drawn from the results of the study were the following: (1) Satisfaction with self in eight of the ten categories of the Self-Concept Inventory was related to prejudice in children, with the categories dealing with personality characteristics and social relations being particularly significant; (2) Satisfaction with physical ability and appearance, and with work habits were not related to prejudice; (3) Children who were satisfied with themselves were less likely to be prejudiced than those who were not; (4) The level of academic achievement was not related to prejudice (with and without intelligence controlled); (5) Boys did not differ significantly from girls in prejudice.

Consequences of the Concentration of Social Classes Within an Urban Area for the Aspirations of High School Boys—Alan B. Wilson, University of California, Berkeley.

This report covers one aspect of a more comprehensive study of "Attitudes of High School Students as Related to Success in School," and is concerned with the derivation of educational values from the immediate social milieu—the climate of the school society.

The technique used is to compare the academic aspirations and achievements of boys with similar social origins who attend schools characterized by different climates of aspiration.

Eight schools in the San Francisco-Oakland urban area were placed into three groups on the basis of their respective rank orders in the distribution of several dimensions of stratification. A comparison of the three groups showed considerable divergence with respect to the modal educational values characterizing the groups of schools.

That these modal differences reflect, in large part, differences in the values inculcated by families of different social classes is obvious. But, conversely, *within* class strata it is apparent that the school norms symmetrically modify attitudes. This isotropic relationship provides confirmation of the cumulative effects of the individual and contextual variates—the boys' own class origins and the dominant class character of the high school's student body.

The effect of school society continues to be evident when students are compared within more homogeneous background categories, when other variates relevant to educational aspirations are controlled, and when educational achievement and certain other values are considered as dependent variates.

The moral character of a school, then, is strongly influenced by the social class characteristics of the population from which it is recruited. Thus social differentiation is inherited along scholastic as well as familial lines.

V—PERSONNEL

The Myth of the Middle Class Social Origin of Teachers—Richard O. Carlson, San Francisco State College.

This study attempted to ascertain the validity of the common generalization that teachers come from the middle class. The objects of the study consisted of

a twenty-five per cent, stratified (on the basis of type of credential), random sample of all individuals receiving teaching credentials from seven teacher training institutions in the San Francisco Bay Area during a four-year period, whose home address was in one of six selected Bay cities. A specialized occupational history for each subject was obtained, as well as an "S" or social class score based on demographic characteristics of the census tract of the individual's home residence. The "S," or socio-economic independence dimension, contains the variables of (1) self-employed workers, (2) college education, (3) domestic help, (4) uncrowdedness of homes, and (5) managerial and professional workers.

A comparison of the "S" scores of the teachers and the general population of the cities involved indicated that teachers over-represent the whole top half of the population and under-represent the bottom half, which supports the interpretation that the generalization of "middle class origin" is a myth.

The study also compared the "S" scores of male and female teachers, those of elementary and secondary teachers, and the scores of persons who remained in the teaching profession and those who dropped out.

Teacher Role Expectations for Teacher Behavior in the Community—John V. Chilcott, University of California, Santa Barbara.

Interviews were conducted in a selected small community with 25 teachers chosen at random from the school directory and 31 residents of the community selected from the city directory of householders.

The purpose of the study was to determine the nature of teacher role expectations at the community level and to compare these expectations with teacher expectations of themselves and teacher-perceived community expectations.

The study lists the expectations of both groups concerning the teachers' clothing, use of tobacco, use of alcohol, social dancing, social acceptance, political behavior, profanity and "risque" jokes, church attendance, hobbies and reading, community activities, location of residences, and the behavior of unmarried teachers and the restrictions placed on teachers. The study analyzes the major differences between community expectations and teacher-perceived community expectations, and concludes that, in spite of what appears to be a large number of restrictions, both the community and the teachers felt that the community was quite liberal with regard to the number of restrictions placed on teachers by the community. For the most part, teacher expectations of teachers reinforced community expectations of teachers and even tended to be more rigid. The teachers entertained quite a few misconceptions about what the community expected of them, and the faulty perceptions of community expectations by the teachers were greatest when the teacher expectations of themselves differed the most from the community expectations of teachers.

The Use of Pupil Accomplices to Investigate Teacher Behavior—Evan R. Keislar and John D. McNeil, University of California, Los Angeles.

The hypothesis for this study was that teachers differ in the value they place on pupil enjoyment as compared with pupil gain in achievement in the determination of their teaching performance. No judgment was made by the investigators as to whether teachers of one kind are more effective than those of the other.

The subjects were forty teachers-in-training who were enrolled in a methods class. Eight were "tested" each day for five days during a one-hour period. Each teacher, assigned to teach four pupils individually in succession, was instructed to use first a "visual" method of teaching spelling and then to use a "kinesthetic" method. They were told to administer a spelling test and to select the method which they deemed more appropriate for further use in teaching the individual students.

The same eight pupils were used as accomplices daily, with each teacher teaching four. Two of the pupils were rehearsed to display greater enjoyment

when the "visual" method was used, but to show greater learning on words taught by the "kinesthetic" method. The other two pupils were trained to do the opposite. Under the instructions used for the first three days, teachers generally selected the method which resulted in greater learning. Additional instructions were given for the last two days, reminding teachers to consider other factors. Under the condition used for the sixteen teachers during the last two days, considerable variability was found. The conclusion was that teachers differ reliably in the extent to which they adopt a method of teaching resulting in pupil "enjoyment" as contrasted with "learning."

Some Hidden Attitudes Toward Teacher Interschool Transfers—Robert M. Kubik, Tyrrell School.

Teachers and administrators in three selected districts were surveyed as to their attitudes toward teacher transfers. The study analyzes the administrators' reasons for interschool transfers, as well as their attitudes toward such transfers or transfer requests and the problems involved in both transfering teachers and receiving transfers. The teachers surveyed reported fourteen areas of difficulty in district transfer programs, most of which could have been improved by the development of sound policies, particularly those involving bases for decision-making and a considerable degree of teacher-administrator consultation and the sharing of teacher transfer information.

The study points out that one of the greatest differences between the attitudes held by teachers and those held by school principals is in the area of what policies, procedures, forms, and vacancy announcements should be published to facilitate the operation. Teachers generally think written transfer policies are desirable, while some principals feel that a transfer procedure which is too accessible and convenient would invite impulsive transfer requests.

Authoritarian Tendencies Among Elementary Teachers and Principals—Philip Lambert, University of California, Los Angeles.

Data on the reliability and related statistical properties of the F-scale were collected from a sample of 350 California elementary school principals and teachers. It was found that:

1. This sample yielded a split-half reliability of .88 and a mean of 3.04.
2. A significant difference ($t=2.60$) at the 1 per cent level of confidence was found between principals and teachers.
3. An item analysis of the questionnaire demonstrates that the F-scale discriminates between the upper and lower quartile of an elementary school principal or teacher population at the 1 per cent level of confidence.
4. There is an absence of sex differences when using the F-scale with principals and teachers with one exception. The data did reveal a significant ($t=2.69$) difference between men and women teachers at the 1 per cent level of confidence.

In terms of reliability and internal consistency one may conclude that the F-scale provides an adequate measuring instrument for studying individual differences in authoritarian-equalitarian personality intrinsic in typical teachers and school administrators.

VI—TESTING

An Analysis of Three Samples of Terms from The American College Dictionary—Hubert C. Armstrong, Claremont Graduate School.

This is a study of three sequentially-stratified, random samples of terms listed in the American College Dictionary. The purpose of the study was to obtain comparable lists of words for use in estimating the magnitude of a defined vocabu-

lary both in the aural and visual language modes. The research problem was to design and select three samples of words which are presumably representative of the specified population of words in the dictionary cited; and to describe the comparability of the samples with respect to: accepted and rejected entries, the Thorndike-Lorge frequency count, number of listed meanings, number of homographs, and the proportions of the principal parts of speech.

It is believed that sub-lists based on the above sample will provide useful scales for estimating the extent of the individual's vocabulary in either or both spoken or visual forms, and will thus provide a basis for estimating the degree to which ability to read approximates ability to understand spoken language at the same vocabulary level.

Validity of Music Aptitude Tests—Richard Raymond Bentley, Napa City Schools.

The problem of this study was to determine the validity of five music aptitude tests. Two experimental methods were employed: (1) documentary analysis of related literature, particularly the tests employed; and (2) statistical treatment of the experimental data derived from the administration of five music aptitude tests.

The five aptitude tests selected for study were: (1) *The Farnum Music Notation Test;* (2) Kwalwasser's *Music Talent Test;* (3) Gaston's *A Test of Musicality;* (4) Whistler and Thorpe's *Musical Aptitude Test;* (5) Wing's *Tests of Musical Ability and Appreciation.*

A statistically significant number of high school instrumental music students from Fresno High School were matched with a group of non-instrumental music students. Matching criteria consisted of grade placement, sex, I.Q., and socio-economic status.

The mean, standard deviation, and standard error of the mean were computed for the experimental population on each of the tests in order to compare the two groups. The Pearson Product Moment coefficient of Correlation was computed between the music aptitude tests, interest questionnaire, and music grades, to show the relationship between the test and the validity criteria for the two groups.

All five of the tests appeared to be valid by the criteria of this study. The mean score of the instrumental students was higher than that of the non-instrumental students on all five music aptitude tests, the Gaston interest inventory, and grades in music. When compared with the normative groups of the five tests and the music interest inventory, the non-instrumental music group was representative of, while the instrumental group was superior to, high school students in general.

The Responses of Average and Gifted Students on the Group Rorschach Test—Janet E. Bleckner, Hayward Union High School District.

The purpose of this study was to determine if there were any measurable personality differences between gifted and average youngsters. Taking part were 100 gifted and 87 average youngsters, with the gifted group consisting of those who had scored between 120 and 154 on the California Test of Mental Maturity.

The group method of administration of the Rorschach Test was used in the study, and scoring was done by the Klopfer method.

The results were in substantial agreement with those of previous studies: they showed no significant differences in the categories of Rorschach responses when average and gifted groups were compared.

The Position of Certain Variables in the Multiple Prediction of the Ability to Solve Problems in Arithmetic—Clinton I. Chase, Idaho State College.

This study was aimed at determining what skills and intellectual factors are (1) primarily and (2) secondarily related to the ability to solve verbal problems

in arithmetic, and what contributions these primary and secondary variables make toward the multiple prediction of problem-solving ability.

The subjects were 119 boys and girls who were enrolled in the sixth grade of two elementary schools in northern California. The criterion test was the problems section of the Iowa Every-Pupil Test of Arithmetic, Form N. A multiple correlation technique was used in the analysis of the data.

Fifteen independent variables, divisible into categories such as intellectual factors, problem analysis, arithmetical skills, arithmetic vocabulary, and reading skill, had originally been established. Of these fifteen, only three—Computation, Reading to Note Details, and Fundamental Knowledge in Arithmetic—were retained as being primarily related to the ability to solve verbal arithmetic problems. When these primary variables had been separately analyzed, the secondary variables were then identified.

It was concluded that, while the number of skills primarily associated with ability to solve verbal arithmetic problems are relatively few, there are a number of other variables which hold a secondary relationship to this ability, and which can be used as effective predictors of the primary variables.

When, and How, Should a Total Score Be Reported on a Multi-Ability and/or Aptitude Test?—Stephen C. Clark, Los Angeles State College.

In using a multi-ability and/or aptitude test, careful attention should be given to the relative weights which each factor contributes, such as:

Linguistic vs. *Quantitative* on the American Council on Education Psychological Examination;

Verbal vs. *Quantitative* on the School and College Ability Test;

Verbal vs. *Numerical* on the College Qualification Test.

Otherwise, the simple adding of part scores to obtain a total score may give undue emphasis to one factor at the expense of another.

Examination of test manuals, as well as data from the Los Angeles State College, reveals numerous situations where the correlation of a part score with the criterion (both grades and achievement tests) exceeds that of the correlation of the total score with the criterion. Statistically, this would not happen if there were proper rating.

With these difficulties in mind, the following cautions and suggestions are offered:

(1) Establish the proper weights needed, at the level being tested and for the particular institution, as both vary considerably; (2) Be sure to obtain the standard deviation of the raw scores in determining relative weights; (3) Consider modifying the scoring formula if a test-scoring machine is used; (4) Determine different "total scores," variously weighted, depending on the uses being made for the tests; (5) Perhaps refrain from reporting any total scores—if they are too misleading.

Predictive Efficiency of the Culture Free Intelligence Test (Cattell)—Frank R. Davis, Orange County Schools.

This study reports the efficiency of the Culture Free Intelligence Test, herein called the IPAT, as a pre-screening device to select for further testing pupils referred as Point I (educable retarded) class candidates.

The sample consisted of 83 pupils of both sexes and eight years or older who had been referred for screening in a district setting up a Point I program. Mean I.Q. on the Wechsler Intelligence Scale for Children for these pupils was 76.

The IPAT was administered as a group test to from three to fifteen pupils at a time. Deviation (z) scores on the IPAT were compared to z-scores on the intake WISC's.

There were found to be a correlation of 0.75 and an index of forecasting efficiency of 34 per cent. A regression equation was established: $X' = .58Y - .55$, where Y represented the z-scores obtained on the IPAT and X' represented the

predicted z-scores on the WISC. The standard error of estimate here was 0.68 z-scorepoints.

From these data a table was prepared showing, for a series of IPAT *raw scores*, the probability that the WISC would fall below 75.

Sex Differences in Intelligence of Educable Mentally Retarded Children—Carmen Finley and Jack Thompson, Sonoma County Schools.

Although individual intelligence tests are designed to keep sex differences at a minimum, sex differences for the Wechsler-Bellevue, Wechsler Intelligence Scale for Children and Stanford-Binet have been reported both in the standardization and other studies, Seashore, Wesman and Doppelt report three possibilities which logically could account for sex differences. These are, (1) that the tests and the scales are unbiased and one sex actually is superior in performance on the test, (2) that the sexes are equal in mental ability, but the chosen test items turned out to be slightly biased in favor of one sex, or (3) again assuming that general ability is not sex differentiated that the sampling of one of the sexes was somehow chosen on a slight bias.

This paper is concerned with the study of sex differences for a specific homogeneous group, educable mentally retarded, on the WISC. Three hypotheses are formulated to test for possible sex differences.

1. There is no sex difference in the intelligence of educable mentally retarded boys and girls on full scale I.Q.
2. There is no sex difference in the intelligence of educable mentally retarded boys and girls on verbal scale I.Q.
3. There is no sex difference in the intelligence of educable mentally retarded boys and girls on performance scale I.Q.

WISC protocols of 153 girls and 200 boys were studied in order to determine the extent of sex differences with educable mentally retarded children. Means and standard deviations were computed for verbal scale I.Q., performance scale I.Q., and full scale I.Q. None of the differences were statistically significant although the difference on verbal scale I.Q. approached significance in favor of boys.

Successful Presentation of Comparative Test Results—Melville J. Homfeld, John L. Carter, and John Kerby, Menlo Park City School District.

The problem of relating the results of standardized testing programs to the needs of the school was studied. From this study a method of comparing the actual achievement on the tests to the anticipated achievement of pupils of similar ability was selected for evaluation of the test results.

The data from the test results were placed in color on transparencies for projection by vue-graph. This permitted their being shown to large numbers of interested persons. At the time of presenting the data the basis for the presentation was explained, questions asked and answered, evaluations made of what was shown, and understandings reached.

By studying the varying levels of ability and determining the needs to be met at each level, the administration is in a better position to provide materials to meet these needs. The teachers are in a better position to translate to the parents the academic status and needs of their children, through the use of scattergrams employing the comparison of each child to others of similar ability.

A Procedure for Constructing Equivalent Alternate Forms — Angus G. MacLean, California Test Bureau.

Equivalence is defined as: (1) the true score of every examinee must be the same on all forms of the same test; and (2) the standard error of measurement must be the same on all forms: To meet the requirements for the first part, it is necessary for all forms to have the same mean and standard deviation and the

correlation between each pair of forms shall be 1.00, when corrected for attenuation. The statistical procedure for attaining equivalence is developed and illustrations of its applications are made.

A New Dimension for Differential Diagnosis Through the Use of the Electronic Computer—John Warne Meracle, Cupertino School District.

The Cupertino Group Testing Program, now in its second year of development, is designed to meet the need for more careful diagnosis of individual and group aptitudes and achievement. It will eliminate the use of teachers for scoring, clerical and statistical manipulation of test data and attempt to provide data quickly and accurately in a complete, meaningfully-interpreted form through the utilization of the "650" electronic computer, IBM tabulating and printing equipment.

With the use of the new test scoring machine which key punches scored results directly to the IBM cards, it is expected that the processing of reports for an entire district of several thousand students could be accomplished within a week's time at a cost which could not be duplicated through a manual operation. In addition, no inaccuracies of test scores could result throughout the entire statistical procedure.

Predictive Validity of the Multiple Aptitude Tests—Donald K. Ottman, California Test Bureau.

The California Test Bureau is to publish a 1959 Manual Supplement for the Multiple Aptitude Tests. This Supplement will contain many new data, including predictive validity for tests and factors using junior high, senior high, and college marks in academic and vocational courses as criteria. It is the purpose of this paper to give some advance reports on the part of the data which deals with the predictability of school marks from MAT scores.

The design of the study was to test and follow-up entire class groups, groups in single schools having a common marking system, being all of the same grade classification, and experiencing a common curriculum. Efforts were made to obtain data very similar to that a school counselor or administrator would have if all students of a particular grade placement were tested simultaneously and their academic records followed over the next several semesters for comparison.

It was concluded that the MAT had higher predictive validity for academic and vocational course marks than one could have inferred from the original 1955 manual. Coefficients computed on the data from a single school having a common curriculum, a common marking system, and students of similar experiential backgrounds tend to excel those computed from data obtained on mixed groups far more heterogeneous in all these aspects.

Since each sample used came from a school separated by at least 400 miles from any other school in the study, and since every major region of the nation was represented, the findings here are not regarded as limited to the schools of this study, but are considered representative of what might be found under similar conditions anywhere the MAT is used.

The Effectiveness of the Graduate Record Examination: Aptitude Test and the Quantitative Evaluative Device as Predictions of Academic Success of Second Semester Senior and Graduate Students at Long Beach State College—Gordon T. Pryor, Long Beach State College.

It was the purpose of this research to determine the effectiveness of the Graduate Record Examination: Aptitude Test (GREAT) and the Quantitative Evaluative Device (QED) as predictors of academic success of second semester senior and graduate students at Long Beach State College (LBSC).

The Sample used in this research consisted of 459 second semester senior and

graduate students who had been tested using the GREAT and the QED during the spring semester of 1958.

The following conclusions were reached:

1. The GREAT and the QED are not effective predictors of individual academic success of second semester and graduate students at the graduate level at LBSC if a linear relationship is assumed.
2. There is a significant advantage in using a quadratic regression instead of a linear regression to express the relationship between scores of the QED and grade point averages (GPA) in graduate courses for second semester senior and graduate students at LBSC.
3. The relationship between scores of the QED and GPA in graduate courses is significant for group prediction of second semester senior and graduate students at LBSC when a non-linear (quadratic) model is used instead of a linear model.
4. The GREAT and the QED appear to be better predictors of academic success of second semester senior and graduate women students at LBSC than of second semester senior and graduate men students at LBSC.
5. The GREAT and the QED appear to be better predictors of grades from upper division courses than of grades from graduate courses obtained by second semester senior and graduate students at LBSC when a linear relationship is assumed.

Norms: Theory and Use—William M. Shanner, California Test Bureau.

The purpose of this paper is to discuss the relationship between the theory upon which achievement test norms are developed and the uses and interpretations of local test results. It presents a discussion of the relationship between achievement test results for individuals, classes, grades, and schools and norming groups and the effects of differences in school grade classification, mental ability, and curricula.

The recommendation is made that achievement test results can best be interpreted when the school grade, chronological age, and mental ability characteristics of the group tested are known and are considered in selecting the norming and reference group most appropriate for interpretation.

A Comparison of Raven's Progressive Matrices, 1938 and the WISC—Irving R. Stout, Stockton Unified School District.

The purposes of this study were: (1) to determine the value of the Raven as a test of intelligence in a junior high school in Stockton; (2) to compare the raw scores of the Raven of a group of pupils considered definitely above average intellectual capacity with the raw scores of the Raven of a group of pupils considered mentally retarded; and (3) to compare the scaled scores of the WISC of these same two groups with each other.

The findings indicate that the Raven will select superior pupils, but the test does not test as high as the WISC, and it does not differentiate between superior individuals. At the lower end of the scale there was, also, a lack of discrimination between individual cases. The test is valuable for screening, and it estimates levels of intelligence based on non-verbal abstract thinking. It cannot be used as a test of general intelligence, and interpretation of scores should be made by personnel well acquainted with the test.

The Correlations Between Scores in Selected Eighth Grade Tests and Success in Ninth Grade Algebra—Wilbur Te Selle, Stockton Unified School District.

This study, made in the Stockton Unified School District in 1956-57, is concerned with the identification of students who on the basis of their test scores should be scheduled to take algebra in junior high school. Tests were admin-

istered to all eighth-grade students in 1956 and to all students who finished algebra in grade nine in 1957.

The tests considered as possible predictive criteria were the language, nonlanguage, and total I.Q. scores from the California Test of Mental Maturity, and the arithmetic concepts, arithmetic problem-solving, and reading comprehension scores from the Iowa Tests of Basic Skills. The objective test used as a criterion of algebra success was the Lankton Algebra Achievement Test.

Product-moment correlations were computed and revealed that for the district as a whole total I.Q. and arithmetic concepts scores were ranking items in predictive efficiency. When these two criteria are considered together by use of the multiple correlation formula, the coefficient of correlation is .617 and the index of predictive efficiency is 21.3 per cent, over 30 per cent better than the best predictive factor used alone. While the arithmetic concepts score is the first ranking predictive criterion for three of the four junior high schools, the multiple regression equation indicates that for the district as a whole the weighting should be slightly—in the ratio of 10 to 9—in favor of the total I.Q. score.

For 235 of the students scores from California arithmetic tests given at approximately the same time were also available. It was concluded after analysis that when the California and the Iowa test score results are both available, any generalizations or rules of thumb concerning algebra readiness should probably match Iowa test scores with California scores half a year or more higher in grade placement.

The Validation of an Abbreviated Wechsler Intelligence Scale for Children for Use with Educable Mentally Retarded—Jack Thompson and Carmen J. Finley, Sonoma County Schools.

The purpose of this paper is to test the hypothesis that the previously proposed abbreviated WISC scale is a valid predictor of full scale I.Q. for other similar mentally retarded children.

The abbreviated scale consisted of five sub-tests: information, picture arrangement, picture completion, coding, and block design. The abbreviated scale gave a multiple correlation coefficient of .896 with full scale I.Q. The standard error of estimate in predicting full scale I.Q. was 4.307 scaled score units or 3.123 I.Q. points. The standardization population consisted of 309 mentally retarded boys and girls who were selected on the basis of established criteria.

The validation population consisted of 173 mentally retarded boys and girls selected on the same criteria. Three methods were used to establish the validity, (1) difference between predicted and full scale I.Q.'s, (2) correlation between predicted and full scale I.Q.'s, and (3) analysis of the amount of deviation between predicted and full scale I.Q.'s.

There was not a significant difference between predicted and full scale I.Q. for the validation group. The correlation between predicted and full scale I.Q.'s for the validation group was of nearly the same magnitude as for the standardization group. There was no significant difference in amount of deviation for actual and predicted full scale I.Q.'s between the standardization and validation groups.

The validation population met all three of the criteria and the abbreviated WISC was presented as a valid predictor of full scale I.Q. for use with educable mentally retarded children.

Arithmetic Aptitude on the SRA Primary Mental Abilities and Arithmetic Performance on the California Achievement Tests at the Beginning of Grade Three—John A. R. Wilson, University of California, Santa Barbara.

A Pearson Product Moment Correlation was run on each of two groups of beginning third graders to compare the performance on arithmetic achievement and arithmetic aptitude. One group was in a British Columbia city and one group in a California city. Both groups had mean performances 25 per cent above the national norms and fewer than 20 per cent of the scores below the national mean.

I.Q.'s were approximately normal.

r's of .36 and .42 respectively for the group were sufficiently high to lead to the rejection of the tentative hypothesis, "That the beginning of arithmetic is postponed so long and taught at such a leisurely pace that when teaching is done with some thoroughness, all of the students can and do master the work hindered only by their interest."

VII—TEACHER TRAINING

Revising a Teacher Training Program—John H. Bright, California Teachers Association.

The purpose of the survey was to obtain information which would be of value in reorganizing the teacher training curriculum. Graduates of a teacher training institution were surveyed regarding their opinions of the value of their courses in education. Graduates in elementary education were requested to return a questionnaire indicating the value of their education courses. The graduates were surveyed in alternate years—1951, 1953, 1955, 1957—and their suggestions were invited for incorporation into the curriculum during the intervening years. Changes in procedures and course content were noted and evaluated.

Numerical Trends in Doctoral Research (Education), 1941-1957—Stanley B. Brown, University of California, Berkeley.

This study presents a subject categorization of research studies in education at the doctoral level which were conducted between 1941 and 1957. Numerical and percentage data are portrayed, together with concluding statements regarding the yearly fluctuation in the topics of study and the conclusions of contributory causes for the fluctuations.

The First Year Grade Point Average as a Predictor of Success at Chico State College—Marvin J. Chmelka, Bidwell Junior High, Chico.

The present study is concerned with the use of two factors—the first-year grade point average and the four-year grade average at the time of graduation—in the development of a formula or index which could serve as a predictive device to assist counselors in advising students who find themselves in a state of indecision after a year of college work. To do this, a separate regression equation was developed for men and women based on the two factors.

The findings revealed many differences between students, including differences in their performance in the various academic divisions. Some of these were as follows: (1) Some divisions, as indicated by higher grade point averages, attracted more capable students; (2) There were indications that some students who had high ability were not pursuing a carefully planned course of study; (3) Some students were unrealistic about their choice of a major and were pursuing courses that were too abstract and theoretical for them; (4) The first year G.P.A. had greater predictive value in certain divisions than in the college as a whole; (5) Probability of graduation for both males and females varied in predictability from division to division.

The major conclusion reached was that on the basis of the first-year average the four-year average could be predicted with sufficient accuracy to be of substantial use to counselors in helping students plan their programs.

Trends in Educational Research at the University of California, Los Angeles, as Shown by Doctoral Dissertations, 1944 to 1958—Juliana Gensley, Redondo Beach City Schools.

In this study the 184 dissertations approved during the years 1944 to 1958 by the Department of Education at the University of California, Los Angeles, were

surveyed for areas of research, sponsors, and length of title. A sample of 146 volumes was further studied to reveal trends in types of research, statistical treatment, and number of pages, exclusive of appendices.

It was found that the most frequently chosen areas were administration, secondary education, and junior college; that three people in the Department of Education had sponsored almost 56 per cent of the dissertations; and that since 1949 there had been a marked increase in statistical reporting, with a variety of statistical techniques being used.

Effects on Educational Aspirations and Vocational Choices of Pupils Participating in an Eighth Grade Teacher-Observer Program in the Menlo Park City School District—Melville J. Homfield, Kenneth Barnes, Raymond Cruickshank, Richard C. Key, Menlo Park City Schools.

The problem considered in this paper is the effect of participation in an eighth grade teacher-observer program on the educational aspirations and vocational choices of pupils in the Menlo Park City School District.

After a careful screening in which academic ability and interest were assessed, twenty-five pupils were selected to participate in the two-week program. Orientation sessions, conferences, lectures and discussions were conducted during the first week, after which the teacher-observers moved into their assigned classrooms, to teach every subject in the curriculum under the direct supervision of the regular teacher.

The program had begun with all interested pupils completing a teacher-observer program application. After the completion of their experience in the classroom they were given the first of a series of annual evaluation questionnaires.

The conclusions offered from analysis of these questionnaires must be considered tentative due to the short time the program has been in effect.

However, there was evidence to support the following: (1) Eighth grade pupils of high caliber do think seriously of their educational future; (2) The teacher-observer program establishes and retains an interest in teaching as a career among most of these pupils; (3) The more teachers a student remembers favorably, the more he is inclined to teaching as a career; (4) The participants who are still interested in teaching as a career remain firm in their choice despite their rating of teacher incomes as relatively low.

Finally, a series of recommendations was made for the improvement of the evaluation procedures of the teacher-observer program.

Student Attitudes Toward an Introductory Course in Professional Education—Edwin L. Klingelhofer, Sacramento State College.

This paper describes the procedures used in the development and scaling of an opinionnaire consisting of 105 Likert-type items used in eliciting student judgments on an elementary course in professional education. Means, measures of variability, and an index of reliability for 591 students enrolled in 17 sections of an elementary course in professional education are presented. The relationships between total test score and age, sex and expected course grade are given. A significant negative relationship between age and student opinion is noted and discussed. The discriminating properties of the items comprising the test in relation to high and low scoring individuals and high and low scoring sections are reviewed. The items are found to discriminate effectively in the aggregate and generally the high scoring section can be differentiated from the low scoring one because of a perceived relationship in the former of course content to post-college goals. The data, when compared with findings in liberal arts subjects, do not suggest that the education course studied is subjected to harsher student criticism than the other subjects.

Teacher Selection and the Edwards Personal Preference Schedule—Curt Stafford, San Jose State College.

The Edwards Personal Preference Schedule was evaluated for possible use as a screening or diagnosing device to be applied to teacher education candidates at the secondary level. The following conclusions were drawn: 1. Single highest or lowest individual personality needs of the PPS are unrelated to the job satisfaction of first year teachers. 2. Single highest or lowest individual personality needs of the PPS are unrelated to student teaching performance. 3. Eight single items of the PPS appear to discriminate between members of known criterion groups of best and poorest student teachers. Validation over the *full range* of student teaching performance still is necessary, however.

The Role of the Junior College in the Preparation of Teachers—Edwin J. Swineford, University of California, Santa Barbara.

The problem of this study was to determine the role of the junior college in the preparation of teachers. The junior colleges studied were from institutions listed in the Junior College Directory, 1951.

Institutional catalogues and other descriptive materials were examined in making the survey of teacher-education courses and programs offered in the colleges. Letters of inquiry were sent to directors of teacher certification in the state departments of education. A check-list questionnaire was sent to 180 selected educators in the field of teacher education to secure their reactions to the problem. Textbooks, periodicals and previous studies in this area provided additional information.

Three aspects of the problem were designated for special attention. These were: (1) Purposes of the junior college as they relate to teacher preparation; (2) Current offerings in teacher preparation in American junior colleges; (3) Attitudes of the profession toward the role of the junior college.

The over-all conclusions arrived at were these: (1) The junior college is not primarily a teacher training institution. It does, however, play a part by providing a general education background upon which specialization in higher institutions can be built; (2) Teacher education proponents could not justify complete programs of teacher preparation in the junior college nor did they believe that the college should offer professional courses in education; (3) Although general education was a preferred basis for teacher education, there was no agreement on how to achieve it; (4) The junior college should direct or orient interested students toward the teaching profession.

Report of Follow-Up Study of Beginning Teachers Prepared at College of the Pacific—Warren J. Woodworth, Rollin C. Fox, College of the Pacific.

A follow-up study of beginning teachers who had been prepared at the College of the Pacific and who were in their first year of teaching was made in the spring of 1953. Its purpose was to secure from the beginning teachers and from their principals evaluations of the adequacy of the college teacher education program and to arrive at recommendations for its improvement.

One questionnaire was developed and sent to the 94 teachers of record and another to their principals.

Upon analysis, the data indicated the following, among other things: (1) In the teachers' judgment, most important in teacher education are methods, student teaching, subject matter, and child development; (2) The quality of preparation received at the College was superior and was highest in student teaching; (3) Teachers and administrators offered few suggestions for improving the teacher education program; (4) The administrators' ratings revealed that the teachers were succeeding unusually well; (5) The areas in which teachers still needed the most help were in instructional planning and teaching methods; (6) The teachers on the whole liked their positions, and intended to make teaching their career.

In conclusion, a number of recommendations were made regarding improvement of the teacher education program, and for further research to this end.

The Measurement of Authoritarianism In Japanese Education

ARTHUR P. COLADARCI

Over the past several years, *The Human Relations Interdisciplinary Research Group* at Nagoya University (Japan) has been constructing a Japanese adaptation of the California F-Scale (1) for use in Japanese social research activities. The work is still in progress, under the direction of Dr. Tsuneo Muramatsu of the Department of Neuropsychiatry of that institution and detailed reports are expected in the near future. Because of a presumed relevance of that scale, the writer secured permission to use the current experimental version in an analysis of the professional attitudes of Japanese public school teachers—a study undertaken under a 1957-1958 Fulbright award and summarized elsewhere (2). The purpose of the present report is to make available some preliminary data on the Japanese version of the F-Scale and to indicate the general nature of the responses made by teachers in Japan. A comprehensive analysis of scale characteristics and responses is now under way and will be reported at a later date.

The Japanese F-Scale

The latest experimental version of the Japanese F-Scale comprises the thirty items reported as Forms 40 and 45 in the California study (1). A series of experimental administrations of earlier forms, against the criterion of clinical evaluation of subjects, resulted in the modification of some of the original items content-wise. The changes required were surprisingly few and the rationale for most of them is immediately apparent (e.g., "the true

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Dr. Arthur P. Coladarci, professor of education and psychology at Stanford University, came to that institution in 1952. He had served previously as psychologist in the Child Study Center of Maryland and later as assistant professor of educational psychology at Indiana University. His Ph.D. was obtained at Yale University in 1950. The article is based upon Dr. Coladarci's experiences working with the Japanese educational system during the past year.

Japanese way of life" for "the true American way of life"). Other changes were based upon empirical grounds and are not as immediately understandable to the outsider. The major ones are the following: "the power of God or Buddha" for "some supernatural power"; "the wild sex life of today" for "the wild sex life of the old Greeks and Romans"; "chiromancy and onomancy" for "astrology"; "protect himself especially carefully against them" for "protect himself especially carefully against catching an infection or disease from them."

The validity and item analysis data are not yet reported in the literature but they indicate that the scale makes reliable discriminations between clinically identified groups of adults and against the definition of "anti-democratic trends" used by Adorno and his colleagues in the California study.

No teachers have been involved in the Japanese studies. One of the purposes of including this scale in the writer's larger study was to assess the utility of the measure in the research focus on teacher characteristics, now emerging in Japan.

F-Scale Performance of Japanese Teachers

With the cooperation of the University of Tokyo Institute of Educational Research and public school administrators in Japan, the Japanese F-Scale was administered to 414 public elementary school teachers, male and female, sampled from a current listing of all elementary schools in the seven perfectures of the Kanto area, which includes metropolitan Tokyo. This scale (and others not included in the present report) was administered through the school principals in the sample schools. The procedures used assured anonymity of responses and of the personal and demographic information needed for analysis.

The response categories used were those usually invoked in this scale: –3, –2, –1, +1, +2, +3, with the negative weights indicating degrees of disagreement and the positive weights indicating degrees of agreement with the scale statements. For the analysis of responses the response weights were transformed into a seven-point continuum of 1, 2, 3, 4, 5, 6, 7; the weight of 4 represents a non-response to the item and is interpreted as "indecision."

Scale reliability was determined by both the lower-bound Kuder-Richardson Formula 20 and the odd-even procedure. The respective coefficients of reliability were .81 and .87, which fall in the range of general acceptability for group testing. These coefficients are, furthermore, of the order of those reported with American subjects (1, 6). The discriminating power of individual items was determined by computing phi coefficients with the Edwards and Kilpatrick procedures for dichotomizing response categories

and total scores (3) and the Jurgensen tables (4). These phi coefficients, which are presented in Table I, ranged from .53 to .87 with a median coefficient of .69 and indicate a generally acceptable discrimination ability for the purposes to which the test was put in the present study. Some of the phi coefficients are quite low and are consistent with recent criticisms that the F-Scale is probably not measuring an unidimensional component (5).

The item mean scores, given in Table I, are quite interesting in view of the Japanese data suggesting that total scale score is as good a measure

TABLE I

Japanese F-Scale Item Means and Phi Coefficients (Discriminating Power), Based on Scores of 414 Japanese Public Elementary School Teachers

*Item**	*Mean*	*(Rank)*	*D.P. (Phi)*	*(Rank)*
1. (obedience and respect)	3.14	(20)	.85	(2)
2. (will power)	4.00	(12)	.70	(14)
3. (war and conflict)	3.85	(14)	.80	(3)
4. (supernatural powers)	2.18	(29)	.77	(5)
5. (cheerful things)	4.98	(4)	.71	(12)
6. (bad manners)	2.82	(25)	.64	(24)
7. (determination)	3.75	(17)	.87	(1)
8. (insult to honor)	3.81	(15)	.66	(21)
9. (rebellious ideas)	3.99	(13)	.78	(4)
10. (support authorities)	1.71	(30)	.74	(8)
11. (weak and strong)	3.11	(21)	.71	(12)
12. (devoted leaders)	4.55	(8)	.73	(9.5)
13. (gratitude to parents)	4.60	(7)	.68	(17.5)
14. ("astrology")	2.55	(27)	.71	(12)
15. (force to preserve)	3.56	(19)	.73	(9.5)
16. (immoral life)	2.34	(28)	.65	(22.5)
17. (wild sex life)	3.87	(10)	.76	(6)
18. (talk less)	3.05	(23)	.75	(7)
19. (plots)	3.69	(18)	.56	(29)
20. (homosexuals)	4.09	(11)	.61	(27)
21. (artists-businessmen)	2.86	(24)	.69	(15.5)
22. (no sane person)	5.29	(1)	.58	(28)
23. (familiarity)	3.08	(22)	.69	(15.5)
24. (suffering)	4.90	(5)	.63	(25)
25. (science)	5.11	(2)	.65	(22.5)
26. (born with urge)	4.52	(9)	.53	(30)
27. (different kinds of people)	5.05	(3)	.67	(19.5)
28. (sex crimes)	3.79	(16)	.68	(17.5)
29. (prying)	4.88	(6)	.67	(19.5)
30. (earthquake)	2.58	(26)	.62	(26)

*In order to keep the table within a reasonable space, each item is identified only by means of its significant term.

of "authoritarianism" in Japan as it is in the United States. If this is the case, the Table I entries indicate that the Japanese subject and the American

subject achieve their scores in quite different ways. This may be indicated by noting the rank order of item means for the Table I subjects, all subjects used in the California study (1), and the American public school teachers studied by McGee (6). The rank order coefficient of correlation *(rho)* for the Japanese and Adorno means is –.37; for the Japanese and McGee rankings, the coefficient is .07. (In the case of the McGee comparison only the 26 common items were used; he substituted four new items for his study of young teachers.) There were several sharp reversals in the rankings of item means, when compared to either of the American rankings. Although these will be given specific analysis elsewhere, they can be noted briefly here for those interested in their possible meaning for cultural dimensions in measurement. Reversals in which the Japanese subjects produced the higher rank order (a more "authoritarian" item mean score) were in the following items: "obedience and respect," "bad manners," "pre-war authorities," "talk less," and "cheerful things." Reversals in the other direction were for: "suffering," "plots," and "born with urge."

Table II presents total score means and standard deviations for the sample as a whole and for the various sub-categories which were defined for the purpose of testing the hypotheses generated in the larger study (2).

TABLE II

Japanese F-Scale Means and Standard Deviations for 414 Japanese Elementary School Teachers, Ordered by Length of Teaching Experience, Degree of Urbanization, Sex and Grade Level

	Mean	*S.D.*	*N*
Experience			
5 years	3.54	.86	70
15 years	3.84	.75	87
Male	3.64	.74	179
Female	3.76	.88	235
Rural	3.74	.76	205
Urban	3.69	.91	209
Primary	3.79	.90	211
Upper Elementary	3.62	.76	203
Total sample	3.71	.83	414

The mean for all teachers (3.71), coincidentally enough, is exactly that reported by McGee for young American elementary school teachers, while the sigma (.83) is smaller than his (1.09). When it is also noted that the distribution of scores for the total sample, and for all sub-categories, is

markedly skewed in a positive direction, it may be seen that the Japanese elementary school teacher is making responses quite consistent with the requirements of the educational reform under way in post-war Japan. Without gainsaying the possible lack of congruence between public verbalizations and relevant action, this finding at least suggests an intellectualized predisposition that is necessary for effective reform-consistent action.

Of the other comparisons presented in Table II, only the age and grade differences are significant at or below the .05 level. The absolute differences are so small, however, that no purpose is served by an attempt at interpretation.

Summary

This report was in the nature of a preliminary report on the Japanese adaptation of the California F-Scale; more definitive analyses are under way. It appears that the current experimental version of the scale is adequately reliable and possesses minimally adequate discrimination power for most of the items involved. The most interesting aspect of this preliminary analysis is that relating to the rank order of item mean scores. It seems rather clear that Japanese and American subjects obtain approximately similar scores in markedly different ways. Many extreme reversals are present and in both directions. The meaning of the foregoing in terms of Japanese culture is not yet considered but there is, undoubtedly, a clear implication for cross-cultural measurement and evaluation.

The data also suggest that Japanese elementary school teachers verbalize propositions that are in accord with the objectives of the educational reform undertaken by the Japanese in the post-war period; responses tend to fall on the non-authoritarian side of the response continuum and the distributions are positively skewed.

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Intelligence Test Scores and the Ability to Learn

JOHN C. NARCISO, JR. AND CRITTENDEN E. BROOKES

It is generally agreed that contemporary measures of intelligence merely reflect intelligence from measures of abilities or achievement, the supposition being that a high degree of achievement presupposes a comparably high degree of intelligence. Educational counselors have long made use of intelligence test scores as indices of the ability to learn. The results of investigations of the relationship between various measures of learning and intelligence test scores have, however, in large part shown negligible correlations. (1,3,4)

Tilton (5), in a critique of the apparent ambiguity, has suggested that measures of learning in previous studies in this field have frequently been inadequate. He has listed three basic criteria which should be met for measures of gain in learning if such measures are to be used as evidence for the validation of intelligence test scores as indices of the ability to learn. Specifically he suggests:

1. The reliability of the measure of gain should be known, and should be as high as the reliability of the end-test.
2. The learning situation should provide an opportunity for each subject to learn according to his ability.
3. There should be opportunity for the full amount of learning to be reflected in the measure of gain.

This paper is a report of an attempt to meet these criteria in a study of the relationship between a measure of learning and intelligence test scores.

Procedure

Fifty college freshmen and sophomores served as subjects. The group consisted of thirty-two women and eighteen men.

John C. Narciso, Jr. is Dean of Students at Trinity University in San Antonio, Texas. Before taking this position he was for nine years Coordinator for Psychology at Chico State College in California. Dr. Narciso obtained his Ph.D. degree in 1952 at the University of Texas.

Crittenden E. Brookes, presently a student at Stanford University School of Medicine, was formerly Counselor at Menlo College, Counselor and Psychology Instructor at Oakland City College, and Research Assistant in the School of Education, Stanford University. Dr. Brookes obtained his Ph.D. degree in 1956 at Stanford.

A ten-syllable list of four-letter nonsense syllables was block-printed on cards 14" by 11", one syllable to each card. The letters were 2½" high and 1½" wide. The cards were hinged together and arranged in such a manner that the list could be manually shown to the subjects one syllable at a time. The nonsense-syllable list was prepared after the manner of Gamble (2) and Woodworth (6).

The list was presented five consecutive times. Each syllable was in view during each presentation for approximately two seconds. A time period of two minutes was allowed after the presentation of the syllables, during which blank sheets of paper and pencils were distributed without comment. After two minutes, the following instructions were read to the subjects:

> Please write your name at the top of the sheet of paper I have given you. Now reproduce as best you can the list of syllables that was presented to you. Do your best to put the syllables in the order they were shown you, and try to spell them correctly. Please print. Go ahead.

Approximately three minutes was allowed for recall, although no specific time limit was set.

The measures of intelligence were derived from the results of the ACE Psychological Examination for College Freshmen which each student had taken upon entering the college.

A measure of the reliability of the nonsense syllable test was derived from the comparison of the original scores with the results of a re-test administered after three months. Learning was inferred from the recall of the syllables.

Results

Individual total scores were the number of syllables recalled correctly. Failure to reproduce the original order of presentation was not counted against the score. The scores were compared statistically with the corresponding Linguistic, Quantitative and Total scores of the ACE.

The results indicated a relatively high positive relationship between the nonsense syllable test scores and the ACE Linguistic and Total scores, the coefficient of correlation in both instances being .48. The correlation between the Quantitative ACE scores and the nonsense syllable test scores was .28, a positive but lower relationship. The coefficient of reliability for the nonsense syllable learning task as determined by the test-re-test method was .66.

Discussion

The results of this study seem to indicate a fairly high and positive relationship between abstract verbal learning ability as inferred from the

recall of nonsense syllables, and intelligence as measured by the ACE.

The writers are not necessarily in agreement with the definition of intelligence as the ability to learn, nor does this study particularly substantiate that point of view. The ability to retain and to dynamically apply what is learned cannot be ignored in any attempt to arrive at a definition of intelligence. The results of this study depend rather heavily on the retentivity as well as the learning involved in the nonsense syllable test.

The results of this study indicate a relatively high positive correlation between a measure of learning and certain intelligence-test scores. To what degree has this procedure met Tilton's (5) criteria? First, the reliability of the measure of gain should be known, and should be as high as the reliability of the end-test. In this case, the measure of gain and the end-test are the same. Thus, they have the same reliability as reported above.

Second, the learning situation should provide an opportunity for each subject to learn according to his ability. Tilton's concern here was that a subject should not be penalized in terms of the percentage of gain. For example, a superior subject beginning with 60 per cent mastery of the material to be learned could gain but 40 per cent at most, while a duller subject beginning with 10 per cent mastery could conceivably gain 90 per cent. In the present study, nonsense syllables were employed as the material to be learned so that an assumption of no past mastery or association might be made.

Third, there should be opportunity for the full amount of learning to be reflected in the measure of gain. Under the conditions of this study, the limit of learning would have been reflected in the correct recall of all ten nonsense syllables. None of the subjects correctly recalled all ten syllables. Thus, all of the subjects began from a common point and learned within the limits imposed by the conditions.

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